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FIFTH ANNUAL REPORT

OF THE

MASSACHUSETTS

HIGHWAY COMMISSION.

1897

JANUARY, 1898.

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Commonwealth of Massachusetts.

*To the Honorable Senate and House of Representatives of the Commonwealth
of Massachusetts in General Court assembled.*

The undersigned commissioners, appointed under the provisions of chapter 476 of the Acts of 1893, entitled "An Act to provide for the appointment of a Highway Commission to improve the public roads, and to define its powers and duties," herewith submit their fifth annual report.

T. C. MENDENHALL.

N. S. SHALER.

W. E. McCLINTOCK.

BOSTON, MASS., Dec. 30, 1897.

APR 30 1914

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LIST OF OFFICERS OF THE MASSACHUSETTS
HIGHWAY COMMISSION.

THOMAS CORWIN MENDENHALL,	}	<i>Commissioners.</i>
NATHANIEL SOUTHGATE SHALER,			
WILLIAM EDWARD MCCLINTOCK,			

CHARLES MILLS,	. . . . .	<i>Chief Engineer.</i>
AUSTIN BRADSTREET FLETCHER,	. . . . .	<i>Secretary.</i>

JOHN MICHAEL MCCARTHY,	. . . . .	<i>Clerk.</i>
WALTER EDWIN HITCHCOCK,	. . . . .	<i>Book-keeper.</i>
MARY ALOYSIUS RILEY,	<i>Stenographer.</i>
EDWARD AUGUSTUS AUSTIN,	<i>Messenger.</i>

LOGAN WALLER PAGE,	<i>Geologist.</i>
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ANNUAL REPORT

OF THE

MASSACHUSETTS HIGHWAY COMMISSION.

The appropriation by which the work of the Highway Commission was to be carried on during the season of 1897 became available somewhat earlier in the construction season than was the case in the preceding year. The act was approved on May 5, 1897, and the amount appropriated was \$800,000. The difficulty which had previously arisen from the lack of means wherewith to begin construction in the spring was avoided by the provision that \$200,000 of this appropriation should be available only for work done after the 1st of January, 1898.

In making the allotments for the construction work of the year 1897 it was necessary to take into account the excesses and deficiencies of the distribution of work in the several counties which had accumulated in previous years. Owing to the unequal distribution of petitions, it was at the outset of the constructive work found impossible to make an equitable distribution in the several parts of the Commonwealth. It therefore became desirable, in distributing the work, to bring the counties which were in deficiency as near as possible to their equitable position. In one case only, that of Worcester County, did it prove necessary, in order to accomplish this end, to undertake more than ten miles of road. The law provides that not more than the above-mentioned length shall be built in any county in any one year without the consent of the Governor and Council. This consent was sought and was at first refused. On a reconsideration, however, it was granted, and the construction in Worcester County has proceeded in accordance with that consent.

In view of the fact that the limitation above referred to was made at the time when the total appropriation was but \$300,000, your commissioners recommend a change in legislation

which will permit them hereafter to build to the extent of twenty miles in any county in any one year, without troubling the Governor and Council with their reasons for so doing. This action seems more desirable for the reason that the average cost of the roads is diminishing and bids fair yet further to diminish, which may make it possible next year to build beyond the limit at present set in more than one county. It seems, indeed, to the Board desirable to altogether strike out this limitation.

As a matter of information regarding the principle on which the commission has made its allotments to the several counties, and the reasons which have led to its adoption, there will be found in Appendix K of this report a copy of the letter sent to the Governor and Council on the occasion referred to above.

In addition to the lay-outs of the previous years, 281,121 feet were laid out during the year 1897, bringing the total length up to 946,489 feet, or 179.26 miles. About 52 miles of highway were actually finished during the year, bringing the total amount of completed State road up to about 160 miles, of which 125 miles have been accepted. A number of sections laid out and partially built must await their completion on the opening of the spring. A full account in detail of the work of the year on each of the several roads will be found in the Appendix to this report.

Up to the beginning of the year there had been received 307 petitions for State highways, from city officers, county commissioners and town authorities. The number has been increased during the year by 93, making the total 400. The petitions received this year represent 78 municipalities.

MEETINGS OF THE COMMISSION.

The commission has held 70 meetings at its office during the year, besides many other meetings in different parts of the State.

Regular meetings were held in every county of the State, as provided for and required by the statutes. Notice was given of these meetings some weeks in advance, and an opportunity was afforded to county, town and municipal authorities and to the general public to discuss and consider matters relating to the construction of State roads or the improvement of highways in general. Still other meetings were held in different localities,

whenever it seemed desirable, to enable the commission to form a correct judgment as to the question of taking a roadway under a properly prepared petition. Stenographic reports are made of all county meetings or other hearings, so that any information presented, together with all discussions, comments or criticisms, will be available for future reference and use.

CONTRACTS.

In the last report the desirability of awarding contracts for building State roads to the town or municipal authorities having jurisdiction where they are built was discussed and affirmed. The commission still believes in the wisdom of this course, and for the reasons there given, even if the cost of construction shall be slightly greater than if let to private contractors. In some localities, however, the authorities do not elect to take the contract, and the number of lettings to private parties is, on the whole, increasing. In some towns there has been a loss encountered by the contractor on the completion of the work, and this fact has in some degree discouraged the taking of contracts by municipal or town authorities. In rare cases this loss has been due to erroneous estimates by engineers in the service of the commission, generally resulting from unforeseen difficulties in procuring or handling material. Whenever this has been found to be the case, the commission has dealt liberally with the town authorities, by making allowances for extra labor or cost of material which had not been provided for in the estimates on which the contract is based. In other cases the loss can unquestionably be attributed to careless business methods on the part of the town authorities. While this is a matter over which the commission has no control, and which it is generally quite unable to prevent, it feels compelled to refer to it, and to call attention, as it did in its report of a year ago, to the fact that the Commonwealth suffers in some degree through the delay which usually accompanies this condition of things, requiring the maintenance of a resident engineer at the place of operation for a longer period than would otherwise be necessary.

Attention is also invited to the paragraph in the report of 1896 in which reference is made to the practice of town or city authorities of paying more than the usual rate of wages

in that locality to laborers whom they employ on the State highway, or of employing those who are not able-bodied. Considered from the stand-point of an economical and fair expenditure of the funds of the Commonwealth, such a practice is not to be commended, and the commission cannot be expected to consider losses which originate in this way.

It is evident that, in making the provisions of the law concerning the letting of the construction of State roads to the authorities of cities and towns, it was supposed that these authorities would proceed in the manner of any private contractor, doing the whole of the work under their own supervision and control. Experience, however, has shown that the greater number of the municipalities sublet the important parts of the work to private contractors, and in some cases they have taken like action with all the work, turning it over to a single agent. When this course is taken the object of the provision concerning the contracts with towns and cities is defeated, as the private contractors select their labor, often bringing it from a distance; they also send in their own supervisors. The result is, the educative effect of the undertakings in the neighborhood where they are carried on is lost.

Your commissioners are not prepared to suggest legislation as regards this matter. It merits, however, the consideration of the General Court.

During the year 95 contracts were made by the commission, of which number 59 were with town or city authorities and 36 were with private contractors. While it is impossible to make an exact comparison of cost, the conditions being never absolutely the same, the prices paid on municipal contracts were approximately the same, on the average, as on contracts with private individuals or firms.

The table of Appendix B shows all contracts made during the year, with prices in detail.

LEGISLATION.

In the last annual report the commission suggested certain modifications of the statutes under which its work is carried on which experience had indicated as desirable. Most of these commended themselves to the General Court, and were enacted, to the very decided advantage of all concerned. An-

other year of experience, during which some new problems have arisen, has developed some other evident imperfections in existing law, to which, with suggested remedies, the attention of the Legislature is respectfully invited.

PRELIMINARY SURVEYS.

The law at present requires that any municipality in petitioning for a State road must submit plans and profiles thereof. Experience shows that the engineering work thus done, though costly to the towns, is insufficient as a basis for construction. It is thus evident that the law as it stands leads to an unnecessary expenditure, and the repeal of that part of the statute requiring plans and profiles to be submitted by the authorities petitioning is recommended.

DAMAGES.

It has appeared to the commission most desirable to have municipalities assume all damages arising from takings of land and other sources connected with the laying out and constructing of State roads within their limits. So far this arrangement has been accomplished by having the local authorities obtain releases from damages, or by giving a guarantee against them. It appears desirable to have legislation which will remove all doubt as to the authority of municipalities to enter into a contract with the commission, to the end that they may become responsible for all such damages.

GRADE CROSSINGS.

At many points in laying out State roads it has been necessary to omit a considerable portion of the road which lies at or near a railway crossing, it being the practice of the commission not to build a State road over a grade crossing, and it seeming undesirable to build on either side of such point within the limits of the way which will have to be altered in order to provide for a highway over or under the railroad. In view of all the conditions, your commissioners suggest that when counties, cities or towns petition for the abolition of grade crossings which lie on the lines of roads which the commission is constructing, the Board be authorized to appear before the court as parties interested, and to offer such contribution to the cost of the improvement as they may deem just.

MAINTENANCE OF STATE ROADS.

At present the Highway Commission has about 125 miles of road under its care, which it is obliged to maintain in good repair. These roads are new, and the cost of such repairs, as is shown by Appendix D, is not great. It must, however, be expected to increase year by year, thus trenching upon the annual appropriations which may be made for the uses of the commission.

In the discussion concerning the matter of repairs which has taken place in several of the county hearings, it has been frequently suggested that while the maintenance of a road should be in the hands of the State Board, the cost of this maintenance might well be taxed upon the counties and towns in which they lie, in some equitable proportion. It seems to your commissioners desirable that such action should be taken, on such terms and conditions as may seem fit to the Legislature to impose.

STREET RAILWAYS.

The statute (chapter 541, Acts of 1896) by which authority is given the commission to make such changes, relocations, etc., in the track of a street railway having a location on a State highway as in the judgment of the commission is desirable or necessary, in order to so facilitate the construction and maintenance of such highway as to ensure the safety of persons making use of the same, does not prove to be entirely satisfactory in its practical working. The provision by which the cost of making such changes must be taxed upon property of the street railway, the money being advanced by the Commonwealth, unless the owners of the property elect to pay it themselves, seems to be neither wise nor just. In the process of taking up and moving a street railway track it is often the desire of the corporation controlling it to make a substantially new construction, substituting better and more costly rails, new ties and other betterments not rendered actually necessary by the mere removal or change of grade required in the decree of the commissioners. In such cases the commission has not felt authorized to advance money to such corporation beyond what it determines to be required for the carrying out of its own decree, believing that it is not the intent of the

statute to provide for structural improvements in street railways by loan of money from the Commonwealth.

In interpreting the meaning of the word "cost," as used in this act, it has been held to include all expenses in the way of additional grading, retaining walls, damages to abutting property, etc., which would not have accrued had the street railway not existed, and in this the commission has acted upon the advice of the Attorney-General. There are instances, however, in which such an adjustment does not seem to be entirely equitable. A franchise having been acquired and a road built before the highway in which it is placed becomes a State road, a considerable expenditure of money may be necessary to so change grade, location, etc., as to make the road conform with the absolute requirements of the State highway. The railway may rest upon an expensive filling along the side of the ordinary travelled way, from which it may be pushed to make room for the macadam of the State road, to the cost of construction of which it has thus made some contribution. In the adjustment of its location, land and grade damages may be created which were purposely avoided in its original building. In these and possibly other cases the question may well arise whether the railway should be called upon to pay the entire cost of the changes made necessary by the construction of the State road. The commission fully appreciates the fact that the highway, being for the free and unrestricted use of all, is of paramount importance, and that the entire location which it occupies must be available for its construction and maintenance, everything else therein existing by sufferance and for the accommodation of the public. It further recognizes the fact that franchises held by street railway corporations are generally valuable, being necessarily in the nature of monopolies, and that for this reason they may well be required to bear, themselves, all expenses incident to their existence. But it is also true that they serve the convenience of the public, that they are demanded by the exigencies of modern life, and that certain public concessions are necessary to their successful administration.

Under existing law the commission has no choice in its action relating to assessments, being compelled to charge upon a railway the total cost of the execution of all decrees

which it may deem necessary. Furthermore, there is no apparent reason why the Commonwealth should be compelled to lend money to any corporation to enable it to do what it is justly compelled to do. The commission would therefore recommend that the statute be so amended as to provide that whenever in the construction of a State highway it shall become necessary to make a change in location or grade or in construction, etc., of a street railway having a location on said highway, the Commonwealth shall pay such part of the cost of making such changes as the Highway Commission shall determine to be fair and just, and that the remainder of said cost shall be paid by the corporation owning or managing said street railway.

Relations somewhat similar to those which exist with the street railways are found also in the case of the telegraph and telephone lines. Here the adjustments have been easily made, and, it is believed, to the satisfaction of the private corporations as well as of the State Board.

ROAD MACHINERY.

Under the provisions of chapter 513 of the Acts of 1896, and section 3, chapter 355 of the Acts of 1897, your commissioners have purchased eleven steam rollers and one stone crusher, which have been distributed as follows:—

Appropriation for road machinery in 1896,	\$12,000 00
Appropriation for road machinery in 1897,	12,000 00
Total appropriations,	<u>\$24,000 00</u>
Cost of steam rollers furnished in 1896, one to each of the following towns: Greenfield, Westfield, Palmer, Winchester, Natick and Ware,	\$11,325 00
Cost of one portable stone crusher furnished in 1896 to the town of Palmer,	637 50
Total expenditure in 1896,	<u>\$11,962 50</u>
Balance unexpended,	37 50
	<u>\$12,000 00</u>
Cost of steam rollers furnished in 1897, one assigned to each of the following towns: Acushnet, Buckland, Spencer, Hingham and Milford,	12,000 00
Total,	<u>\$24,000 00</u>

Although these machines are in the keeping of the county commissioners, your commissioners have, as far as possible, endeavored to see that they are satisfactorily cared for. In the last annual report it was recommended that the statute be so amended as to give the Highway Commission directive authority over this road machinery, but such amendment was not made. Divided authority and responsibility still exist, and there is reason for believing that in some instances private contractors have been allowed to make use of machinery evidently designed for public use. For this and other reasons, recited in the report of 1897, the commission respectfully renews the recommendation made at that time.

COUNTY ASSESSMENTS.

In accordance with the provisions of section 5, chapter 497, Acts of 1894, the commission has certified to the Auditor of the State the several amounts to be repaid to the Commonwealth by the counties in which State roads have been built, up to the year 1897, the same being one-fourth of the total amount expended in highway construction in each county. The repayments are to be made at the end of six years from the date of the expenditure, or at such earlier date as the county authorities prefer. This plan was fixed upon, after a careful consideration of the subject by the commission, as being more likely to give general satisfaction than any other arrangement.

The total amount thus assessed for repayment on account of work done during the first three years of the operation of the commission, 1894, 1895 and 1896, is \$275,288.69.

THE DISTRIBUTION OF STATE ROADS IN THE COMMONWEALTH.

For the information of the many interested in this question, the following is reprinted from the report of 1897:—

The selection of roadways which shall be rebuilt as State roads at the expense of the Commonwealth is naturally the most difficult problem with which the commission has to deal. The nature of that problem will be more readily understood after an examination of the map of the State, which forms a part of this report, on which is laid down, in addition to county and town boundaries, the roadways which

the commission has been petitioned to take and those which it has up to this date actually accepted as State roads, nearly all of the latter having been actually constructed.

Under the provisions of the law the commissioners are not permitted to control the expenditure of the appropriation entirely by their own judgment. They are restricted by two provisions, the wisdom of which they do not at all criticise, but which should always be kept in mind in considering the results of their labors. The first of these is that "all constructions of State roads shall be fairly apportioned among the different counties," and in this they have been guided in the main by the relative miles of roadway existing in the several counties. The second is the restriction growing out of the use of the petition. It was obviously the intention of the Legislature to limit the initiative of the Highway Commission in planning for the location of State ways. As is well known, the commission cannot of its own motion accept or reject any route; it has to await the petitions of the municipalities or the county commissioners. The only manner in which it can effect any satisfactory grouping of these petitions, so that continuous routes may come from the constructive work, is by rejecting the petitions which may come to it, or by counselling with the authorities having the right to petition in advance of their formal requests.

In order to keep the State roads from having a total lack of ultimate purpose in their relations to each other in the distribution of the Commonwealth, the commission has been compelled gradually, though not formally, to come to a state of mind as regards the selection of roads which are to be taken. In part this rather undetermined project is indicated by the distribution of the routes which have been accepted, as is shown on the accompanying map. In part, though less distinctly, it is indicated by the direction of the petitions, the greater part of which have been submitted after more or less conference with the commission.

It appears to your commission that the time has now come when some statement, still necessarily tentative, should be made which will set forth in a general way the views of the commission as to the policy to be followed by the Commonwealth in the construction of State roads. This statement is submitted in no sense as a hard-and-fast plan, but in order to set forth the direction in which the work of the commission is inevitably drifting; and we should hope that this statement may provoke criticism, and, if need be, modification of the action.

It seems, in the first place, clear that the most important of the many needs which are to be met by the construction of State roads is that which relates to the connection of the centres of business in

the Commonwealth with each other, in so far as the business relations demand this connection. Thus, where two towns have a large exchange of relations, the way lying through other towns which profit little by the traffic, there is good reason why the State should take charge of the main connecting way.

Closely related to this is the case of a considerable number of smaller, less populous towns, surrounding a large city or centre of dense population, with which they have intimate business relations. It furnishes the market for their products, and the profit to the producer as well as the cost to the consumers is largely determined by the cost of local transportation. Even where facilities for transportation by rail exist, there is still much use of the public highway whenever it is in reasonably good condition. It is in evidence before the commission that many articles of produce, especially perishable and delicate fruits, are preferably sent many miles to the city market in farm wagons, where shipping by rail would be both quicker and cheaper, on account of the better condition in which they may be delivered.

In making its selections among numerous petitions the commission has endeavored to keep in mind the great advantages arising from easy connections between large centres of population and the surrounding agricultural areas, for in so doing the demands of both urban and suburban populations are recognized and their mutual interests promoted.

Another class of cases arises, in which one or more towns lie remote from the rail or water ways, losing opportunities of advancement on account of this hindrance. These conditions are in some cases so grave that the average cost during the year of transporting a ton of freight from a village otherwise well placed for manufacturing to the business centres of the Commonwealth is greater than would be incurred in transporting the same burden from the central portion of the Mississippi valley to the city of Boston. In these cases, also, the commission feels impelled to better the traffic conditions by improving the way.

In yet other, but not numerous, cases, portions of the States adjacent to this Commonwealth have their natural business centres in some of our cities or towns, but the people thus residing beyond the bounds of the Commonwealth are deterred from seeking access to its markets by the difficulties of the way. In such instances it seems desirable that good roads should be provided to the bounds of the Commonwealth.

The conditions above mentioned may be regarded as of a local character. There remains yet another of such interests of a general nature to be provided for. These will be met by so grouping the State roads that they will in the end afford continuous routes through

the Commonwealth, which may serve the interests of pleasure travel or the occasional distant carriage which would be done by ordinary wagons where the roads were good. These extended ways, including in general those which relate to driving for a distance of more than fifteen miles, are of greater importance to the interests of the Commonwealth than might at first sight appear. A considerable part of the present and much of the prospective value of real estate in the Commonwealth, as well as of the traffic which takes place therein, is due to the incoming of people from the central and western parts of the country, who seek summer residences and family homes in the very attractive rural districts of the State. People who thus resort to the Commonwealth for recreation desire opportunities for driving such as would be afforded by a well-organized system of State ways, which would be laid out and beautified with some reference to the natural and historic interests of the country. It is hardly necessary to say that the use of the bicycle for pleasure travel would also be thus accommodated.

Although the commissioners do not propose to build roads which relate only or even mainly to pleasure travel, they feel that the service which can be done by a system which relates to such travel is so great and of such economic importance to the Commonwealth that it should always be kept in mind.

An examination of the map referred to above will reveal in some degree the groupings of highways up to this time, as indicated by petitions and by acceptance. A few rather long, continuous lines of State highway are apparently demanded at the present time, and their construction ought to be kept in view in the acceptance of petitions; but the commission must not allow itself to be too much influenced by an adjustment of petitions, which often stand only for local interest and activity. While there is often good reason for accepting one highway on account of local conditions, although it may not form a part of any general scheme, and another because it does fit into such a scheme, although of less local value than another which may be near by, there is often equally good reason for postponing action on a third because it is relatively of less *immediate* importance than either of the others.

The commissioners are of opinion that nearly every mile of road thus far petitioned for should some time be built as a State highway; but it is clear that, as only a comparatively small number of miles can be completed annually, some selection must be made.

In choosing which shall be undertaken first, the commissioners must be governed by considerations of the broadest character, many of which will not be evident to those who necessarily think most of local interests. The order of presentation of petitions can have no

influence, nor should it be inferred that, because a petition is not granted this year, it may not be next, or the year after. Outside of the limitations put upon them by the statute, the commissioners are bound to exercise their best judgment in all cases; and, while they are likely to be far from infallible, and welcome fair criticism, all who are unselfishly interested in the extension of this important system of State highway construction are likely to accept the judgment as the result of a comprehensive knowledge of the whole situation, growing out of the necessary consideration of the scheme as a whole.

MISCELLANEOUS.

Aid to Municipalities.

At the outset of the work of the building of State roads there seemed to be some reason to fear that the municipalities would decrease their individual endeavors in the direction of better roads. It is a satisfaction to note that this has not been the case. At many points in the State the towns having taken contracts for the construction of State roads have, after the close of their engagements with the commission, proceeded, with the machinery which they had acquired for State work, to build ways on their own account. These additional roads have been patterned on those paid for by the Commonwealth, and are of excellent quality; and we may hope that the habit of road-building will be fostered rather than hindered by the State aid.

As the work of the commission becomes better known, it is more and more called upon for advice concerning the roads which the municipalities are to build at their own cost. A recent instance of this relation has presented itself in the request from the town of Webster that the commission would draw up the contracts which were to serve in letting the town road. The commission understands that it is entirely within its power to give such aid, and it is glad to serve the municipalities in this capacity.

As an example of the increased facilities for road construction, which is largely a measure of increased interest in the work, it may be stated that when the inquiries which resulted in the organization of the commission were made in 1892 there were only 29 steam rollers in the Commonwealth, while there are now 125.

Gravel Roads.

Experiments in the construction of gravel roads are still in progress in localities especially favorable to this type of highway. Undoubtedly the first cost of construction may in many cases be greatly reduced by the use of gravel, even though it may prove necessary to use a thin layer of broken stone to insure permanency of surface. It would be unwise, however, to cheapen the building of a road to such an extent that the expense of subsequent maintenance would exceed the interest on the cost of a satisfactory and lasting construction.

Table of Quantities and Costs.

The labor of preparing and publishing in its complete form the table of Appendix C, which shows the quantities and cost of all the items entering into road construction, is so great that for this year and in the future said tables will include only the work of the current year. Those interested can easily summarize the matter by reference to previous reports.

Valuation and Road Construction.

Under date of April 9, 1897, the following order was passed by the Legislature : —

Ordered, That the Massachusetts Highway Commission be requested to give in its next annual report a tabulated statement of the appropriations made by the various cities and towns of the State for the repair and construction of roads and bridges during the year 1897.

With some difficulty this matter has been obtained, and the results are presented in Appendix J.

Economy of Construction.

The experience of the commission clearly indicates that the cost per mile of building roads in short sections is, as regards the engineering and construction expenses, much greater than where considerable lengths of way are built at once ; therefore it seems advisable that hereafter, while not abandoning the plan of remedying serious local difficulties by short constructions, the number of pieces of road undertaken in any one year should be considerably reduced.

North Shore Road.

The work of the commission on certain roads, notably on that extending from Boston to Newburyport, has been hindered by difficulties which are incident to the construction of roads near cities. Thus, a section in Revere, where it was necessary to take land in order to avoid the expense of crossing Beaumont Hill, has been delayed by protracted negotiations concerning damages to property.

In the case of the section from Lynn towards Saugus River, delay has been caused by the fact that a bridge across the Saugus River cannot be built without a special legislative act giving the commission authority to build, and the consent of the Federal authorities. This point has been determined by the decision of the Attorney-General. Moreover, it appears that to build a fit bridge over the aforesaid river will demand an expenditure of from fifty thousand to one hundred thousand dollars, according to the width and mode of construction adopted.

As regards legislation necessary to provide for the construction of the bridge over Saugus River, your commissioners recommend that, in addition to the authority for the construction of the bridge, a special appropriation be made for the expense thereof; this for the reason that the allotment which can probably be made in any one year to the counties of Essex and Suffolk, in which the bridge lies, would be insufficient to complete the undertaking. Moreover, if the allotments to those counties were expended in the construction of the bridge, all other work in said counties would have to be suspended.

Engineering.

The engineering department was organized with Mr. Charles Mills in charge of all engineering and construction work, with Mr. J. C. S. Taber as first assistant engineer in charge of surveying parties and office work and Mr. A. M. Lovis as second assistant engineer.

Messrs. F. C. Pillsbury, W. R. Farrington, W. B. Wheeler and J. A. Johnston have been employed as division engineers. Messrs. H. R. Starbird, H. P. Wires, E. J. Nichols, G. G. Lovering and S. A. Parsons have been employed as chiefs of

survey parties, with E. N. Colburn, W. A. Grover, H. A. Hall, C. A. Welton, A. B. Farnham, J. M. Kimball, S. Litchfield, J. H. Pillsbury, E. B. Walbridge, N. B. Wilbur, E. P. McClintock, H. H. Bachelder and H. D. Phillips as transitmen, and F. C. Ayres, M. L. Brown, Jr., G. D. Buckley, J. J. Gleason, L. J. Proctor, E. N. Sampson, A. L. Southworth, P. H. Belknap, C. A. Raymond and L. R. Brine as rodmen. Messrs. A. N. Johnson, H. V. Sandford, J. H. Taylor, J. P. Dahlgren, W. W. Chase, D. M. Hudson, A. H. Blevins and W. G. Burns have been employed in the draughting room. Mr. E. J. O'Hara has been employed as stenographer to the Chief Engineer.

For list of resident engineers employed during the year 1897, see Appendix E.

Estimates for 1898.

The amount appropriated for the use of the commission by the last Legislature was \$800,000. It was provided, however, that \$200,000 of this could not be expended until after Jan. 1, 1898, thus establishing a fund for the beginning and prosecution of road-building during the spring months, before the regular annual appropriation was likely to be made. Having in view the availability of this sum for use during the winter and spring months, the commission recommends for the year 1898 an appropriation of \$600,000, with the provision of the act of last year, that \$200,000 of the sum shall be actually expendable only after Jan. 1, 1899.

Report of the Geologist.

In Appendix G of this report will be found an account of the field and laboratory studies of road-building in progress under the direction of the commission, and made by Mr. L. W. Page. It is a continuation of that in the report of last year.

EXPENDITURES.

The following is a summary of the expenditures of the Highway Commission during the year 1897. Although the statement shows a considerable amount of money unexpended at this date, it is the least amount needed to complete contracts already made and to meet the necessary expenses of the office.

BARNSTABLE COUNTY.

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
Barnstable,	1897	\$497 58	-	\$497 58
Bourne,	1897	3,764 49	-	3,764 49
Brewster,	1895	-	\$124 39	124 39
Brewster,	1896	122 12	25 87	147 99
Brewster,	1897	7,926 23	-	7,926 23
Dennis,	1895	-	180 65	180 65
Dennis,	1896	-	70 89	70 89
Dennis,	1897	7,316 59	-	7,316 59
Sandwich,	1897	6,751 88	-	6,751 88
Truro,	1895	5,387 10	14 22	5,401 32
Yarmouth (North),	1894	-	18 77	18 77
Yarmouth (North),	1895	-	25 06	25 06
Yarmouth (North),	1896	20 75	53 41	74 16
Yarmouth (North) extension,	1896	2,315 95	11 20	2,327 15
Yarmouth (South),	1895	-	244 14	244 14
Yarmouth (South),	1896	4,400 81	153 91	4,554 72
Yarmouth (South),	1897	3,566 10	-	3,566 10
Totals,	-	\$42,069 60	\$922 51	\$42,992 11

BERKSHIRE COUNTY.

Adams,	1897	\$3,957 37	-	\$3,957 37
Dalton,	1895	555 18	\$270 21	825 39
Dalton,	1896	1,130 52	99 50	1,230 02
Great Barrington,	1894	-	171 13	171 13
Great Barrington,	1896	1,013 70	4 76	1,018 46
Great Barrington,	1897	3,241 09	-	3,241 09
Hancock,	1895	33 37	55 11	88 48
Hancock,	1896	6,934 27	3 07	6,937 34
Lee,	1894	-	31 55	31 55
Lee,	1895	300 31	22 26	322 57
Lee,	1896	1,161 86	3 01	1,164 87
North Adams,	1894	-	48 54	48 54
North Adams,	1896	1,014 15	3 62	1,017 77
North Adams,	1897	1,237 89	-	1,237 89
Pittsfield,	1894	-	95 19	95 19
Pittsfield,	1897	2,136 88	-	2,136 88
Richmond,	1897	3,623 15	-	3,623 15
Williamstown,	1895	-	16 20	16 20
Williamstown,	1896	7,241 16	4 22	7,245 38
Windsor,	1897	1,772 93	-	1,772 93
Totals,	-	\$35,353 83	\$828 37	\$36,182 20

BRISTOL COUNTY.

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
Acushnet,	1897	\$4,770 05	—	\$4,770 05
Fairhaven,	1894	—	\$6 02	6 02
Fairhaven,	1895	—	2 71	2 71
North Attleborough,	1894	—	57 75	57 75
North Attleborough,	1895	—	8 06	8 06
North Attleborough,	1896	590 50	—	590 50
North Attleborough,	1897	1,827 21	—	1,827 21
Rehoboth,	1895	—	6 02	6 02
Rehoboth,	1896	1,371 91	3 31	1,375 22
Somerset,	1895	—	5 18	5 18
Somerset,	1896	101 04	—	101 04
Somerset,	1897	4,990 08	—	4,990 08
Taunton,	1895	154 32	14 58	168 90
Taunton,	1896	68 64	358 25	426 89
Westport,	1894	—	92 37	92 37
Westport,	1896	210 91	40 59	251 50
Westport,	1897	5,800 48	—	5,800 48
Totals,	—	\$19,885 14	\$594 84	\$20,479 98

DUKES COUNTY.

Cottage City,	1894	\$209 91	\$125 06	\$334 97
Cottage City,	1895	303 90	321 86	625 76
Cottage City,	1896	2,393 72	2 23	2,395 95
Edgartown,	1897	3,296 82	—	3,296 82
Tisbury,	1894	—	208 59	208 59
West Tisbury,	1895	1,002 32	66 72	1,069 04
West Tisbury,	1896	2,433 83	24 15	2,457 98
West Tisbury,	1897	2,353 88	—	2,353 88
Totals,	—	\$11,994 38	\$748 61	\$12,742 99

ESSEX COUNTY.

Andover,	1895	—	\$6 71	\$6 71
Andover,	1896	\$3,134 09	3 86	3,137 95
Andover,	1897	5,063 14	—	5,063 14
Beverly,	1895	—	78 75	78 75
Gloucester,	1894	—	40 03	40 03
Gloucester,	1895	976 89	15 61	992 50
Lawrence,	1896	2,057 77	—	2,057 77
Merrimac,	1897	5,571 11	—	5,571 11
Methuen,	1896	7,378 92	—	7,378 92
Newburyport,	1896	2,875 70	6 86	2,882 56
Newburyport,	1897	1,470 19	—	1,470 19
Wenham,	1897	6,016 34	—	6,016 34

ESSEX COUNTY — *Concluded.*

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
West Newbury,	1895	—	\$72 71	\$72 71
West Newbury,	1896	\$4,090 30	282 81	4,373 11
West Newbury,	1897	2,306 86	—	2,306 86
Totals,	—	\$40,941 31	\$507 34	\$41,448 65

FRANKLIN COUNTY.

Ashfield,	1897	\$2,097 09	—	\$2,097 09
Buckland,	1894	—	\$28 23	28 23
Buckland,	1895	1,013 92	43 67	1,057 59
Buckland,	1896	3,152 37	23 92	3,176 29
Buckland,	1897	5,332 65	—	5,332 65
Charlemont,	1897	6,135 25	—	6,135 25
Deerfield,	1894	101 52	94 38	195 90
Deerfield,	1895	53 60	3 19	56 79
Orange,	1894	445 43	78 54	523 97
Orange,	1895	619 14	544 37	1,163 51
Orange,	1897	4,683 03	—	4,683 03
Shelburne,	1894	—	28 96	28 96
Shelburne,	1895	—	135 26	135 26
Shelburne,	1896	1,670 72	—	1,670 72
Shelburne,	1897	3,798 46	—	3,798 46
Sunderland,	1897	2,430 37	—	2,430 37
Totals,	—	\$31,533 55	\$980 52	\$32,514 07

HAMPDEN COUNTY.

Brimfield,	1897	\$1,997 33	—	\$1,997 33
Chicopee,	1897	11,308 60	—	11,308 60
Monson,	1894	—	\$150 79	150 79
Russell (Huntington),	1894	—	127 85	127 85
Russell (Huntington),	1895	23 41	245 85	269 26
Russell (Fairfield),	1894	222 42	144 79	367 21
Russell (Fairfield), 1,	1896	98 94	10 68	109 62
Russell (Fairfield), 2,	1896	5,727 60	—	5,727 60
Russell (Fairfield),	1897	3,558 50	—	3,558 50
Westfield,	1894	117 06	7 65	124 71
Westfield,	1896	1,485 27	3 43	1,488 70
West Springfield,	1895	715 45	164 90	880 35
West Springfield,	1896	—	6 76	6 76
Wilbraham,	1895	—	204 55	204 55
Wilbraham,	1896	773 33	17 55	790 88
Wilbraham,	1897	3,237 60	—	3,237 60
Totals,	—	\$29,265 51	\$1,084 80	\$30,350 31

HAMPSHIRE COUNTY.

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
Easthampton,	1895	\$981 11	\$61 01	\$1,042 12
Easthampton,	1896	-	27 13	27 13
Goshen,	1894	111 78	509 67	621 45
Goshen,	1895	1,373 73	151 74	1,525 47
Granby,	1894	-	121 53	121 53
Hadley,	1894	-	355 29	355 29
Hadley,	1895	-	400 45	400 45
Hadley,	1896	117 24	2 47	119 71
Hadley,	1897	3,139 22	-	3,139 22
Huntington,	1895	691 50	304 21	995 71
Huntington,	1896	2,404 54	4 35	2,408 89
Northampton,	1894	-	37 65	37 65
Northampton,	1897	5,526 90	-	5,526 90
South Hadley,	1895	778 06	123 75	901 81
South Hadley,	1897	4,384 99	-	4,384 99
Ware,	1897	386 83	-	386 83
Williamsburg,	1896	5,996 95	3 49	6,000 44
Totals,	-	\$25,892 85	\$2,102 74	\$27,995 59

MIDDLESEX COUNTY.

Ashby,	1894	-	\$49 77	\$49 77
Ashby,	1895	\$4 18	27 43	31 61
Ashby,	1896	1,455 46	1 39	1,456 85
Ashby,	1897	5,274 54	-	5,274 54
Bedford,	1897	4,094 63	-	4,094 63
Boxborough,	1897	5,357 24	-	5,357 24
Concord,	1897	4,294 98	-	4,294 98
Lexington,	1895	111 65	4 60	116 25
Lexington,	1896	-	3 98	3 98
Lexington,	1897	5,745 95	-	5,745 95
Lincoln,	1895	183 59	23 82	207 41
Lincoln,	1896	-	8 54	8 54
Lincoln,	1897	3,270 61	-	3,270 61
Lowell (North),	1897	7,751 17	-	7,751 17
Lowell (South),	1897	6,904 04	-	6,904 04
Marlborough (East),	1897	601 08	-	601 08
Marlborough (West),	1897	1,331 21	-	1,331 21
North Reading,	1897	3,959 30	-	3,959 30
Stoneham,	1897	1,949 83	-	1,949 83
Sudbury,	1897	2,266 67	-	2,266 67
Townsend,	1896	277 61	3 92	281 53
Townsend,	1897	2,616 08	-	2,616 08
Tyngsborough,	1895	-	40 17	40 17
Tyngsborough,	1896	4,896 39	8 74	4,905 13
Watertown,	1895	556 36	72 95	629 31
Watertown,	1896	-	54	54
Wayland,	1897	555 65	-	555 65
Totals,	-	\$63,458 22	\$245 85	\$63,704 07

NANTUCKET COUNTY.

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
Nantucket,	1894	—	\$262 36	\$262 36
Nantucket,	1895	\$2 22	207 17	209 39
Nantucket (extension),	1895	77 07	182 36	259 43
Nantucket,	1896	2,257 16	41 38	2,298 54
Nantucket,	1897	88 32	—	88 32
Totals,	—	\$2,424 77	\$693 27	\$3,118 04

NORFOLK COUNTY.

Cohasset,	1897	\$3,583 89	—	\$3,583 89
Holbrook (Weymouth),	1894	—	\$52 93	52 93
Holbrook,	1896	747 81	17 05	764 86
Norfolk (macadam),	1895	7,069 30	22 41	7,091 71
Norwood,	1895	—	3 68	3 68
Norwood,	1896	30 22	—	30 22
Norwood,	1897	5,306 09	—	5,306 09
Walpole,	1894	—	26 02	26 02
Walpole,	1895	774 93	3 68	778 61
Walpole (North),	1897	4,279 38	—	4,279 38
Walpole (South),	1897	3,303 36	—	3,303 36
Weymouth,	1895	324 30	65 78	390 08
Weymouth,	1896	596 08	146 69	742 77
Weymouth,	1897	3,076 46	—	3,076 46
Wrentham,	1894	—	6 02	6 02
Wrentham,	1895	—	57 74	57 74
Wrentham,	1897	5,126 43	—	5,126 43
Totals,	—	\$34,218 25	\$402 00	\$34,620 25

PLYMOUTH COUNTY.

Brockton,	1897	\$5,584 46	—	\$5,584 46
Duxbury,	1894	—	\$26 36	26 36
Duxbury,	1895	—	58 70	58 70
Duxbury,	1897	2,496 06	—	2,496 06
Hingham,	1894	—	20 99	20 99
Hingham,	1896	350 93	91 89	442 82
Hingham,	1897	3,927 03	—	3,927 03
Marion,	1894	—	20 62	20 62
Marion,	1895	700 53	2 89	703 42
Marion,	1897	2,878 44	—	2,878 44
Marshfield,	1894	—	15 30	15 30
Marshfield,	1896	601 74	2 95	604 69
Mattapoissett,	1894	96 21	6 02	102 23
Mattapoissett,	1895	—	96	96
Middleborough,	1894	—	5 24	5 24

PLYMOUTH COUNTY — *Concluded.*

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
Middleborough,	1895	\$242 62	\$53 45	\$296 07
Middleborough,	1896	1,143 17	28 37	1,171 54
Middleborough,	1897	2,802 90	—	2,802 90
Plymouth,	1894	—	60 45	60 45
Plymouth,	1895	—	33 82	33 82
Plymouth,	1896	7,997 12	85 74	8,082 86
Plymouth,	1897	1,034 98	—	1,034 98
Scituate,	1894	2,763 02	—	2,763 02
Scituate,	1895	484 22	46 98	531 20
Wareham,	1896	10 84	8 43	19 27
Whitman,	1894	2,129 42	17 61	2,147 03
Whitman,	1895	41 60	20 85	62 45
Whitman,	1896	99 31	5 26	104 57
Totals,	—	\$35,384 60	\$612 88	\$35,997 48

SUFFOLK COUNTY.

Revere,	1897	\$266 87	—	\$266 87
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WORCESTER COUNTY.

Athol,	1895	\$336 79	\$446 63	\$783 42
Athol,	1896	669 25	687 76	1,357 01
Auburn,	1895	—	17 53	17 53
Auburn,	1896	524 69	137 34	662 03
Auburn,	1897	7,001 03	—	7,001 03
Barre,	1897	6,521 55	—	6,521 55
Brookfield,	1897	3,811 72	—	3,811 72
Fitchburg,	1894	—	10 05	10 05
Fitchburg,	1895	234 34	23 04	257 38
Fitchburg,	1897	5,691 20	—	5,691 20
Gardner,	1897	4,771 94	—	4,771 94
Grafton,	1897	5,918 10	—	5,918 10
Hardwick (New Braintree),	1897	631 13	—	631 13
Holden,	1894	—	196 12	196 12
Holden,	1895	—	94 64	94 64
Holden,	1896	1,658 19	3 86	1,662 05
Holden,	1897	3,678 63	—	3,678 63
Leicester,	1894	—	285 71	285 71
Leicester,	1895	—	804 40	804 40
Leicester,	1896	3,756 64	—	3,756 64
Northborough,	1897	1,825 10	—	1,825 10
Paxton (1),	1895	740 17	561 96	1,302 13
Paxton (2),	1895	330 52	134 86	465 38

WORCESTER COUNTY — *Concluded.*

TOWN OR CITY.	Year of Lay-out.	EXPENDED IN 1897.		
		Construction.	Repair and Maintenance.	Total.
Paxton,	1896	\$56 73	\$33 16	\$89 89
Paxton,	1897	5,260 71	—	5,260 71
Phillipston,	1897	1,748 32	—	1,748 32
Princeton,	1897	5,020 42	—	5,020 42
Shrewsbury,	1895	16 24	15 02	31 26
Shrewsbury,	1896	402 90	13 46	416 36
Shrewsbury,	1897	5,013 51	—	5,013 51
Spencer,	1897	45 32	—	45 32
Sterling,	1897	5,566 84	—	5,566 84
Sturbridge,	1897	1,152 86	—	1,152 86
Uxbridge,	1897	5,017 31	—	5,017 31
Warren,	1896	1,364 62	6 15	1,370 77
Warren,	1897	6,374 53	—	6,374 53
Westborough,	1897	6,723 85	—	6,723 85
West Boylston,	1897	59 37	—	59 37
Westminster,	1894	—	10 87	10 87
Westminster,	1895	408 65	36 85	445 50
Westminster,	1896	720 38	2 77	723 15
Westminster,	1897	6,227 50	—	6,227 50
Worcester,	1896	5,792 59	21 02	5,813 61
Worcester,	1897	4,313 11	—	4,313 11
Totals,	—	\$109,386 75	\$3,543 20	\$112,929 95
Grand totals,	—	\$482,075 63	\$13,266 93	\$495,342 56

GENERAL EXPENSES.

Salary of commissioners,	\$6,000 00
Travel of commissioners,	875 40
Clerical assistance,	6,943 31
Printing, including postal cards and stamped envelopes,	1,234 85
Advertising hearings,	72 32
Office supplies,	443 82
Geologist's assistant and expenses,	397 03
Telephone, including tolls,	159 80
Postage,	145 00
Making and painting signs,	76 00
Appraisal of property,	50 00
Miscellaneous items, consisting of telegraph and express charges, car fares and minor office expenses,	421 36
	<hr/> 16,818 89
<i>Amount carried forward,</i>	<hr/> \$512,161 45

Amount brought forward, \$512,161 45

*Relocation of Street Railways under Chapter 541, Acts of
1896.*

Methuen, 1896, section,	. . . . .	\$2,895 20	
Leicester, 1896, section,	. . . . .	1,256 96	
		<hr/>	4,152 16
Grand total,			<hr/> \$516,313 61

NOTE. — This year's expenditure includes \$560 of mileage appearing in the 1897 report, and this year used and charged to construction.

T. C. MENDENHALL,

N. S. SHALER,

W. E. McCLINTOCK,

Massachusetts Highway Commission.

APPENDIX.

APPENDIX A.

REPORT OF CHIEF ENGINEER.

Boston, Dec. 31, 1897.

To the Massachusetts Highway Commission.

GENTLEMEN: — I herewith submit the following report of work done during the year 1897. All the work laid out in 1894, 1895 and 1896 has been completed, with the exception of part of a lay-out in the town of Truro.

Construction work during the past year has been carried on under 128 contracts, covering 140 lay-outs, made in 99 cities and towns.

The following statement shows the amount of work done in the year 1897: —

Excavation (cubic yards),	266,186.1
Ledge excavation (cubic yards),	5,878.94
Masonry, dry (cubic yards),	4,057.16
Masonry, cement (cubic yards),	2,556.78
Gravel (cubic yards),	28,636.00
Telford (square yards),	3,848.6
Shaping (square yards),	565,954
Broken stone (square yards),	402,946
Broken stone (tons),	132,326
Guard rail (feet),	53,170.5
Side drains (feet),	39,529.4
Gutters (square yards),	9,000.3
Vitrified clay pipe, 18-inch (feet),	176.0
Vitrified clay pipe, 15-inch (feet),	180.0
Vitrified clay pipe, 12-inch (feet),	8,381.9
Vitrified clay pipe, 10-inch (feet),	806.2
Vitrified clay pipe, 8-inch (feet),	262.0
Iron pipe, 12-inch (feet),	482
Stone monuments,	1,353

STATEMENT OF EXPENDITURES FOR 1897.

The Legislature of 1897 appropriated \$800,000, \$600,000 of which was to be expended for construction in 1897. The commission having allotted to the county of Worcester a sum sufficient to build more than ten miles of road in that county, it was necessary to obtain the

consent of the Governor and Council before the amount of work to be done in the different towns and cities in that county could be determined. Consequently much delay was caused, with the result that the incompleted work is mostly within the limits of that county.

The allotment of \$200,000 to be expended on work in 1898 will allow work to be done earlier in the season than ever before. If the Legislature makes an appropriation sufficient to make a total of \$600,000 for road construction in 1898, it will be possible to so arrange the work that the roads can all be completed before Dec. 1, 1898, with the exception of such grading work as the commission may choose to have done on roads which are to receive the broken stone in the year 1899.

MAINTENANCE.

The amount expended in maintenance, \$13,266.93, has been for the most part caused by the cleaning of gutters and the placing of binding material upon those roads where the travel is so light that the wear is not sufficient to furnish the necessary amount of such material as is removed by the action of winds and rains.

The repairs caused by freshets this year have not cost so much as those of last year, the only considerable expense arising from two heavy rainfalls in the towns of Orange and Athol.

Another important outlay has been brought about by the tendency to travel in one track, which prevails in many sections of the State. In many cases this has caused a single line of road to be worn for a width of one and a half to two feet, and it has been necessary to fill these depressions with broken stone. The "Don't drive in the middle of the road" signs, which have been erected on the roads where this tendency has been marked, have had a good effect, except in the towns of South Hadley, Granby, Wilbraham and Nantucket. The drivers of teams in these places have paid very little attention to the signs, with the result that these tracks have had to be twice filled with broken stone during the present season.

On the island of Martha's Vineyard, where the travel is as light as it is in the towns previously mentioned, the people appreciate the benefits of good roads, and take the trouble to divert their horses from a single track, with the result that the travel is spread all over the surface. On the section of road in West Tisbury, where the width of the broken stone is but ten feet, the travel has spread over the surface so that no horsepath has developed. It seems that a width not exceeding twelve feet would be ample for the needs of the travel on this road, and probably on many others.

In the roads first built by the commission, the broken stone, with one or two exceptions, has been spread on the road in three courses:

Table showing the highways constructed or contracted for by the commission, and the nature of the several constructions, to Jan. 1, 1895

Table showing the highways constructed or contracted for by the commission, and the nature of the several constructions, to Jan. 1, 1898.—Continued.

Table showing the highways constructed or contracted for by the commission, and the nature of the several constructions, to Jan. 1, 1898.—Continued.

* Variable omitted

² Gravel laid 21 feet in cuts, 25 feet to embankment.* 1980) but not in the case of the α subunit.

one and one-quarter to two and one-half inches in thickness for the bottom course, one-half inch to one and one-quarter inches for the second course, and screenings for the top course. The following year, and during part of the year 1896, some of the roads showed signs of wearing, and horse tracks had developed. On a number of the roads the stone was put on in two layers, the size of the stone varying from half an inch to two and one-half inches. Where the stone was uniform in quality good results were obtained from this practice; but with the ordinary field stone, varying in hardness, it was found that the softer stone and the smaller bits wore out rapidly, leaving the harder stone projecting above the surface, presenting rather an unsightly appearance. However, the roads built with this material in the sizes named do not unravel any more than where the stone is put on in separate sizes. Where the stone is put on in separate sizes, for the first two or three years, or until the upper course is worn through, the road is much smoother, although the horse track appears to develop more rapidly. Owing to the difference in the hardness of the native stone, it would probably in all cases be the better policy, when these roads need resurfacing, to resurface with the No. 2 trap rock.

The policy of using native stone on the roads where this material can be obtained much cheaper than the trap rock is, in my judgment, the proper one to pursue, as in all roads constructed by the commission more or less settlement takes place, and the native stone, after showing signs of material wear, makes an excellent foundation for receiving a three-inch wearing layer of trap rock.

I would also recommend that, in the next season, the commission grade as many roads as possible, with the view of covering them with stone after the expiration of the following winter. This would allow the settlement due to natural causes to take place, and culverts or side drains, which the first study of the road might not have shown necessary, could then be put in.

The policy of the commission in flattening out the slopes of the embankments 4 to 1 will, in the end, be more economical than the construction and maintenance of guard rail, besides giving to the road a better appearance than when guard rail is used.

LOCATION OF STREET RAILWAYS.

On most of the State highways where railway tracks have been laid, it has been the custom to locate them on the side of the road next the sidewalk, the grade of the top of the rail conforming to the regular cross-sections of the road, thereby allowing the water to pass from the side of the road over the track into the regular gutter by the sidewalk. Some objection to this location has been made by

the representative railway people, they claiming that the water will settle in their roadbed and cause them more or less trouble in winter; but I have not yet seen any case where the water has proved a hindrance, provided the space between the rails is so graded as to throw the water into the gutter, and if catch-basins are placed where necessary.

On several sections of State highway the railway track has been located on the side of the road, but with the grade of the rails several inches higher than where the cross-section of the road would place them. This has had the effect of causing three gutters to be built on the road, with the additional expense of providing for carrying the water under the railway track into the gutter by the sidewalk, or into the culverts and catch-basins. The result is that the side of the road at these places is more or less cut out, through the action of the water in the gutter, and the road has a contracted appearance.

DRAIN PIPE.

On a few sections of road constructed during the present year iron pipe in place of vitrified clay pipe has been used with good results. I would recommend that the commission contract for a thousand feet of iron pipe, to be used in those places where it is necessary to place the drain so near the surface that the ordinary clay pipe would be broken by the weight of the roller.

WIDTH OF TRAVELLED WAY.

Formerly much criticism was made concerning the width of the travelled way which the commission ordered covered with broken stone. A study of the accompanying table will show the proportion of the roadways travelled to the proportion constructed. The width of all roads, with the exception of two, viz., Truro and West Tisbury, has not been less than twenty-one feet. The widths given in the following table are in feet. In each case, in addition to the width of the macadam, there is a shoulder at least three feet in width, built of gravel or broken stone, and rolled by a steam roller. In many cases the shoulder exceeds three feet in width.

As the roads become older, the travel gradually spreads out over a larger area. The result of this is that the horse track, which first appears on many of the roads, gradually disappears; but a careful study of the table will show that the width of the macadam is ample for the requirements of the travel.

Respectfully submitted,

CHAS. MILLS,

Chief Engineer.

Table showing Widths of Travelled Way.

TOWN OR CITY.	County.	Width of Macadam.	MAXIMUM WIDTH OF TRAVELLED WAY.		WIDTH OF COMMONLY TRAVELLED WAY.	
			1896.	1897.	1896.	1897.
Acushnet,	Bristol, . . .	15	-	15	-	12
Andover,	Essex, . . .	18	24	24	24	20
Ashby,	Middlesex, . .	15-20	12	12	9	9
Athol,	Worcester, . .	17	16	16	10-12	12
Auburn,	Worcester, . .	15	12	13	9	9
Barre,	Worcester, . .	15	-	13	-	9
Bedford,	Middlesex, . .	15	-	12	-	8
Beverly,	Essex, . . .	18	20-24	22	20	16
Bourne,	Barnstable, . .	15	-	10	-	8
Boxborough,	Middlesex, . .	15	-	12	-	8
Brewster,	Barnstable, . .	15	-	12	-	9
Brockton,	Plymouth, . .	16	-	18	-	12
Brookfield,	Worcester, . .	15	-	12	-	9
Buckland,	Franklin, . . .	15-24	10	10	7-9	8
Charlemont,	Franklin, . . .	15	-	15	-	10
Chicopee,	Hampden, . . .	20	-	20	-	12
Concord,	Middlesex, . .	15	-	15	-	10
Cottage City,	Dukes, . . .	15	-	21	-	15
Deerfield,	Franklin, . . .	15	12-14	14	11	12
Dennis,	Barnstable, . .	15	-	12	-	9
Duxbury,	Plymouth, . . .	15	12-14	12	7	9
Easthampton,	Hampshire, . .	15	12-13	12	9-10	10
Edgartown,	Dukes, . . .	15	-	21	-	15
Fairhaven,	Bristol, . . .	15	-	18	-	12
Fitchburg (Westminster St.), .	Worcester, . .	15	15	14	10	10
Gardner,	Worcester, . .	Graded.	-	12	-	8
Gloucester,	Essex, . . .	15	15	17	15	13
Goshen,	Hampshire, . .	15	10	11	7	8
Grafton,	Worcester, . .	15	-	11	-	9
Granby,	Hampshire, . .	15	9	14	5	10
Great Barrington,	Berkshire, . .	15-18	-	25	-	12
Hadley,	Hampshire, . .	15	15-18	14-17	10	10
Hancock,	Berkshire, . .	Graded.	-	18	-	8
Hingham,	Plymouth, . .	15	17	15	10	9
Hingham (1897 lay-out), . . .	Plymouth, . .	15	-	10	-	8
Holbrook,	Norfolk, . . .	Gravel.	-	12	-	8

Table showing Widths of Travelled Way — Continued.

TOWN OR CITY.	County.	Width of Macadam.	MAXIMUM WIDTH OF TRAVELLED WAY.		WIDTH OF COMMONLY TRAVELLED WAY.	
			1896.	1897.	1896.	1897.
Holden,	Worcester, .	15-18	13-18	11	10	9
Huntington,	Hampshire, .	15	9	11	7	8
Lawrence,	Essex, . . .	18	-	21	-	17
Leicester,	Worcester, .	15-18-24	15	20	10-12	12
Lexington,	Middlesex, .	15	15-20	16	15	12
Lincoln,	Middlesex, .	15	15	15	10	9
Lowell (North),	Middlesex, .	15	-	15-25	-	9-12
Lowell (South),	Middlesex, .	18	-	18	-	12
Monson,	Hampden, .	15	12	14	8-10	10
Marion (1894 and 1895 lay-outs),	Plymouth, .	15	15	18	10	9
Marion (1897 lay-out), . . .	Plymouth, .	15	-	12	-	9
Marshfield,	Plymouth, .	15	14	12	8	9
Mattapoisett,	Plymouth, .	15	-	18	-	12
Merrimac,	Essex, . . .	15	-	12	-	9
Methuen,	Essex, . . .	15	-	15	-	10
Middleborough,	Plymouth, .	15	25-30	21-12	20-25	21-9
Nantucket,	Nantucket, .	15	-	21	-	8
Newburyport,	Essex, . . .	15	15	13	8-10	9
Norfolk,	Norfolk, . .	15	10	10	10	7
North Adams,	Berkshire, .	15	10-12	13	8-10	9
Northampton (Bridge Street),	Hampshire, .	20	18	18	12	14
Northampton (1897 lay-out), .	Hampshire, .	15	-	12	-	10
North Attleborough,	Bristol, . .	15-24	15-20	18	10-15	15
North Attleborough (gravel), .	Bristol, . .	Gravel.	-	6	-	6
Northborough,	Worcester, .	15	-	12	-	8
Norwood (Ellis end),	Norfolk, . .	15	-	16	-	10
Orange,	Franklin, . .	17	16	16	10-12	12
Paxton,	Worcester, .	15	13	13	9	10
Pittsfield,	Berkshire, .	15	-	21	-	12
Plymouth,	Plymouth, .	15	15	12	9	8
Princeton,	Worcester, .	15	-	11	-	8
Rehoboth,	Bristol, . .	15	9	15	9	9
Richmond,	Berkshire, .	Gravel.	-	16	-	8
Russell,	Hampden, . .	15	8-10	11	7	7
Sandwich,	Barnstable, .	15	-	11	-	9
Scituate,	Plymouth, .	15	14	18	8	12
Shelburne,	Franklin, . .	15-18	12-15	12-15	8	10

Table showing Widths of Travelled Way — Concluded.

TOWN OR CITY.	County.	Width of Macadam.	MAXIMUM WIDTH OF TRAVELLED WAY.		WIDTH OF COMMONLY TRAVELLED WAY.	
			1896.	1897.	1896.	1897.
Shrewsbury,	Worcester, .	15-18	12-18	18	7-12	12
Somerset,	Bristol, . .	15-18	15	18	9	12
South Hadley,	Hampshire, .	15	15	14	10	10
Sterling,	Worcester, .	15	-	11	-	7
Sturbridge,	Worcester, .	15	-	11	-	8
Townsend,	Middlesex, .	15	-	12	-	8
Taunton,	Bristol, . .	15	20	20	10-15	10
Tisbury,	Dukes, . .	15	-	21	-	15
Tyngsborough,	Middlesex, .	15	10	12	10	8
Truro,	Barnstable, .	Graded.	-	-	-	6
Walpole,	Norfolk, . .	15	15	12	8	9
Wareham,	Plymouth, .	15	-	15	-	10
Warren,	Worcester, .	15	13	12	7	9
Watertown,	Middlesex, .	27	33	33	25-30	25-30
Wenham,	Essex, . .	15-18	-	14	-	9
Westborough,	Worcester, .	15	-	12	-	10
Westfield,	Hampden, .	15-18	13	13	9	9
West Springfield,	Hampden, .	18	12-15	14	10	10
Westminster,	Worcester, .	15	15	15	9	10
West Newbury,	Essex, . .	15	14	12	8	8
Westport,	Bristol, . .	18	14	21	14	12
West Tisbury,	Dukes, . .	10-12-15	-	15-20	-	8-15
Weymouth,	Norfolk, . .	15	21	18-21	21	12-15
Whitman,	Plymouth, .	18	15	22	11	13
Wilbraham,	Hampden, .	15	8-9	11	7	8
Williamsburg,	Hampshire, .	15	-	12	-	8
Williamstown,	Berkshire, .	15	10-12	13	9	9
Windsor,	Berkshire, .	Graded.	-	12	-	6
Worcester (Paxton),	Worcester, .	15	-	12	-	10
Wrentham,	Norfolk, . .	15	-	11	-	8
Yarmouth (North),	Barnstable, .	15	-	15-21	-	12-15
Yarmouth (South),	Barnstable, .	15	-	12-21	-	8-15

The widths of the travelled way on the roads in the following towns, 1897 lay-out, are not given because the roads are not completed, or have been but recently opened to travel: Adams, Andover, Ashfield, Barnstable, Brimfield, Cohasset, Hardwick, Marlborough, New Braintree, Norwood (Walpole end), Phillipston, Revere, Stoneham, Sudbury, Sunderland, Uxbridge, Ware and Wayland.

APPENDIX B.

SHOWING CONTRACT PRICES ON

	TOWN OR CITY.	Number of Contract.	Contractor.	EXCAVATION.						Ledge Excavation.
				All Kinds.	Borrow.	Sand.	Gravel.	Hard-pan.	Clay.	
				Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.
1	Acushnet, . . .	186	Town, . . .	-	-	\$0 35	\$0 35	\$0 35	\$0 35	\$1 75
2	Adams, . . .	245	George Shand, .	\$0 30	\$0 30	1 50	-	-	-	-
3	Andover, . . .	187	Town, . . .	-	-	30	30	30	30	1 75
4	Ashby, . . .	197	Town, . . .	-	-	30	30	50	50	1 75
5	Ashfield, . . .	268	Keene & Foster,	19	25	-	-	-	-	1 75
6	Auburn, . . .	188	Town, . . .	-	-	35	35	35	35	1 75
7	Barnstable, . .	243	A. J. Wellington.	25	-	-	-	-	-	-
8	Barre, . . .	246	Thomas Hennessey.	35	-	-	-	-	-	-
9	Bedford, . . .	233	Wm. H. Mague,	25	40	-	-	-	-	1 00
10	Beverly, . . .	271	City, . . .	45	-	-	-	-	-	1 75
11	Bourne, . . .	234	Wm. H. Mague,	25	-	-	-	-	-	-
12	Boxborough, . .	227	Town, . . .	30	-	-	-	-	-	1 75
13	Brewster, . . .	179	Town, . . .	-	-	25	25	50	50	1 75
14	Brewster, . . .	181	Town, . . .	-	-	25	25	50	50	1 75
15	Brimfield, . . .	262	A. J. Wellington.	30	-	-	-	-	-	-
16	Brockton, . . .	216	City, . . .	-	-	30	30	50	50	1 75
17	Brookfield, . .	259	Town, . . .	35	-	-	-	-	-	1 75
18	Buckland, . . .	201	Town, . . .	30	-	-	-	-	-	1 75
19	Charlemont, . .	247	Town, . . .	30	-	-	-	-	-	1 75
20	Chicopee, . . .	235	City, . . .	35	30	-	-	-	-	1 75
21	Cohasset, . . .	260	Town, . . .	45	-	-	-	-	-	1 75
22	Concord, . . .	217	Town, . . .	-	-	35	35	50	50	1 75
23	Dennis, . . .	218	Keene & Foster,	30	-	-	-	-	-	-
24	Duxbury, . . .	236	Town, . . .	30	-	-	-	-	-	1 75
25	Edgartown, . .	202	Town, . . .	-	-	25	25	25	50	1 75
26	Fitchburg, . . .	254	City, . . .	30	40	-	-	-	-	1 75

1 Bridge excavation.

APPENDIX B.

STATE ROADS DURING 1897.

RUBBLE MASONRY.		Gravel.	Telford.	Shaping.	BROKEN STONE.		Vitrified Clay Pipe, 12 Inch.	Fencing.	Side Drains.	Cobble Gutters.	Bounds.	Catch-basins.	
Dry.	Cement.				Local.	Trap.							
Cubic Yard. \$3 00	Cubic Yard. \$6 00	Cubic Yard. \$0 50	Sq. Yard. \$0 35	Sq. Yard. \$0 02	Ton. \$1 41	Ton. -	Linear Foot. \$0 60	Linear Foot. \$0 15	Linear Foot. \$0 35	Sq. Yard. -	Each. \$1 50	Each. -	1
2 50	² 5 00	50	-	02	-	\$1 95	-	14	-	-	1 25	-	2
3 00	6 00	50	35	02	³ 1 70	-	60	15	35	-	1 50	-	3
2 50	5 00	40	35	02	1 36	-	60	15	35	-	1 25	-	4
2 50	6 50	-	-	-	-	-	70	18	-	-	2 00	-	5
3 00	5 00	50	35	02	1 34	-	60	15	35	-	1 40	-	6
-	-	50	-	02	1 70	-	60	-	-	-	1 50	\$25 00	7
2 50	5 00	50	-	02	1 52	-	50	15	-	-	1 50	3 00	8
2 50	4 50	50	-	02	1 50	-	-	20	45	-	1 50	-	9
2 50	5 00	50	35	02	-	2 00	60	15	35	\$0 60	1 25	-	10
-	-	50	-	02	1 85	-	-	-	-	-	1 50	-	11
3 00	6 00	50	30	02	1 35	-	60	15	30	-	1 25	-	12
3 00	7 00	60	35	02	1 57	-	65	16	-	65	1 50	-	13
3 00	7 00	60	35	02	1 47	-	65	16	35	65	1 50	-	14
4 00	⁴ 6 00	80	-	-	-	-	60	15	-	-	1 50	-	15
3 00	6 00	50	30	02	1 05	-	60	15	30	-	1 50	-	16
3 00	6 00	50	35	02	-	1 65	60	15	35	-	1 30	-	17
2 50	5 00	45	35	02	-	2 01	60	15	35	-	1 50	-	18
3 00	6 00	50	35	02	⁵ 1 85	2 05	60	15	35	-	1 25	Cost	19
5 00	⁶ 12 00	1 30	40	02	-	1 84	60	15	40	-	1 25	-	20
3 00	6 00	75	30	02	1 20	-	60	15	35	-	1 30	-	21
4 00	7 00	45	35	02	1 45	-	60	15	35	-	1 35	-	22
3 00	8 00	-	-	02	1 47	-	60	15	-	-	1 50	20 00	23
3 00	6 00	50	35	02	1 70	-	60	15	35	-	1 25	-	24
4 50	7 00	1 00	50	02	2 22	-	65	17	45	1 00	1 25	-	25
3 00	⁷ 6 00	40	30	02	⁵ 1 34	1 89	60	15	30	-	1 25	-	26

² Cement masonry for bridge, \$6 per cubic yard; superstructure, \$500.³ Ledge stone.⁴ Cut masonry, \$15 per cubic yard; superstructure of bridge, \$125.⁵ Granite.⁶ Brick masonry, per M.⁷ Brick for arches in place, \$20 per M.

SHOWING CONTRACT PRICES ON

	TOWN OR CITY.	Number of Contract.	Contractor.	EXCAVATION.						Ledge Excavation.
				All Kinds.	Borrow.	Sand.	Gravel.	Hard-pan.	Clay.	
				Cubic Yard	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.
1	Gardner, . . .	203	Town, . . .	\$0 35	-	-	-	-	-	\$1 75
2	Grafton, . . .	225	Town, . . .	30	-	-	-	-	-	1 75
3	Great Barrington, .	255	Town, . . .	30	-	-	-	-	-	1 75
4	Hadley, . . .	215	A. J. Wellington.	40	\$0 60	-	-	-	-	-
5	Hancock, . . .	199	Lathrop & Shea,	30	-	-	-	-	-	-
6	Hardwick (New Braintree, Ware).	263	A. J. Wellington.	30	40	-	-	-	-	-
7	Hingham, . . .	228	Town, . . .	35	-	-	-	-	-	1 75
8	Holden (Worcester),	189	Town, . . .	-	-	\$0 35	\$0 35	\$0 35	\$0 35	1 75
9	Holden (Bridge), .	204	Town, . . .	-	-	35	35	35	35	1 75
10	Lexington, . . .	205	Town, . . .	-	-	30	30	50	50	1 75
11	Lincoln, . . .	190	Town, . . .	-	-	35	35	50	50	1 75
12	Lowell (Boulevard extension).	211	A. J. Wellington.	30	-	-	-	-	-	-
13	Lowell (Princeton Street extension).	219	A. J. Wellington.	35	50	-	-	-	-	-
14	Lynn, . . .	-	-	-	-	-	-	-	-	-
15	Marion, . . .	220	Town, . . .	30	-	-	-	-	-	1 75
16	Marlborough (East),	256	City, . . .	-	-	30	30	50	50	1 75
17	Marlborough (West),	272	City, . . .	-	-	30	30	50	50	1 75
18	Merrimac, . . .	248	C. H. Kelleher, .	25	-	-	-	-	-	2 50
19	Middleborough,	221	Town, . . .	30	-	-	-	-	-	1 75
20	Montague, . . .	-	-	-	-	-	-	-	-	-
21	Nantucket, . . .	275	A. J. Wellington.	20	-	-	-	-	80	-
22	Nantucket, . . .	-	-	-	-	-	-	-	-	-
23	New Braintree, ¹ . .	-	-	-	-	-	-	-	-	-
24	Newburyport, . .	167	C. H. Kelleher, .	25	50	-	-	-	-	2 00
25	Norfolk, . . .	264	Town, . . .	35	-	-	-	-	-	-
26	North Adams, . .	151	Myron R. Fisk,	25	-	-	-	-	-	-
27	Northampton, . .	212	City, . . .	-	-	30	30	50	50	1 75
28	North Attleborough,	249	C. H. Kelleher, .	40	40	-	-	-	-	1 65
29	Northboro' (East), .	261	A. J. Wellington.	30	40	-	-	-	-	-
30	Northboro' (South),	-	-	-	-	-	-	-	-	-
31	North Reading, . .	191	Town, . . .	-	-	30	30	30	30	1 75
32	Norwood, . . .	250	Town, . . .	-	-	30	35	50	50	1 75

¹ See Hardwick (New Braintree, Ware).

STATE ROADS DURING 1897 — *Continued.*

RUBBLE MASONRY.		Gravel.	Telford.	Shaping.	BROKEN STONE.		Vitrified Clay Pipe, 12 Inch.	Fencing.	Side Drains.	Cobble Gutters.	Bounds.	Catch-basins.	
Dry.	Cement.				Local.	Trap.							
Cubic Yard. \$3 00	Cubic Yard. \$5 00	Cubic Yard. \$0 50	Sq. Yard. \$0 35	Sq. Yard -	Ton. -	Ton. -	Linear Foot. \$0 60	Linear Foot. \$0 15	Linear Foot. \$0 35	Sq Yard. -	Each. \$1 50	Each. -	1
3 00	6 00	50	35	\$0 02	\$1 50	-	60	15	35	-	1 40	-	2
3 00	6 00	2 65	30	-	-	-	60	15	35	-	1 50	-	3
4 00	6 00	{ 2 85 70 }	-	02	-	\$2 10	{ 1 75 75 }	30	-	-	1 75	\$35 00	4
4 00	5 00	60	-	-	-	-	-	15	24	-	1 00	-	5
4 00	6 00	50	-	02	1 40	-	60	15	40	-	1 50	25 00	6
3 00	6 00	75	30	02	1 25	-	60	15	35	-	1 30	-	7
3 00	6 00	50	35	02	1 45	-	60	15	35	-	1 25	-	8
3 00	6 00	50	35	02	1 45	-	60	15	35	-	1 25	-	9
2 50	6 00	60	35	02	1 40	-	60	15	35	-	1 50	-	10
3 00	6 00	50	35	02	1 50	-	60	15	35	-	1 50	-	11
-	-	60	-	02	1 65	2 25	-	-	35	-	1 60	-	12
-	-	50	-	02	1 80	2 00	-	-	-	-	1 75	-	13
-	-	-	-	-	-	-	-	-	-	-	-	-	14
3 00	6 00	60	30	02	1 20	⁴ 1 00	60	15	30	-	1 50	-	15
3 00	6 00	60	35	02	1 35	-	60	15	35	-	1 50	-	16
3 00	6 00	60	35	02	1 35	-	60	15	35	-	1 50	-	17
4 00	6 00	50	-	02	1 65	-	55	20	30	-	1 00	-	18
3 00	6 00	55	33	02	1 30	-	60	15	30	-	1 35	-	19
-	-	-	-	-	-	-	-	-	-	-	-	-	20
-	-	² 1 75	-	02	2 00	-	-	20	-	-	1 50	-	21
-	-	-	-	-	-	-	-	-	-	-	-	-	22
-	-	-	-	-	-	-	-	-	-	-	-	-	23
2 70	3 00	50	-	02	1 35	-	50	19	30	\$0 50	1 00	-	24
-	-	50	35	02	1 40	-	-	-	-	-	-	-	25
-	-	40	-	02	⁵ 1 90	-	-	15	-	-	1 25	-	26
4 00	6 00	60	30	02	-	1 77	60	15	35	-	1 50	-	27
5 00	7 00	45	-	-	-	-	50	20	-	-	1 50	-	28
-	8 00	60	-	02	1 25	-	60	15	-	-	1 50	-	29
-	-	-	-	-	-	-	-	-	-	-	-	-	30
3 00	6 00	50	35	02	⁶ 1 75	-	60	15	35	-	1 50	-	31
3 00	7 00	60	35	02	1 40	-	60	15	35	-	1 25	-	32

² Screened.³ Twelve-inch iron pipe.⁴ Tailings.⁵ Local and trap.⁶ Ledge stone.

SHOWING CONTRACT PRICES ON

	TOWN OR CITY.	Number of Contract.	Contractor.	EXCAVATION.						Ledge Excavation.
				All Kinds.	Borrow.	Sand.	Gravel.	Hard-pan.	Clay.	
				Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.
1	Orange, . . .	226	Town, . . .	-	-	\$0 30	\$0 30	\$0 30	\$0 30	\$1 75
2	Paxton, . . .	193	Town, . . .	-	-	35	35	45	45	1 75
3	Phillipston, . . .	265	Fred E. Ellis, .	\$0 35	-	-	-	-	-	2 50
4	Pittsfield, . . .	251	Myron R. Fisk, .	35	-	-	-	-	-	2 00
5	Plymouth, . . .	276	Nicholas White, .	-	\$0 20	-	-	-	-	2 00
6	Princeton, . . .	237	Town, . . .	35	-	-	-	-	-	1 75
7	Revere, . . .	278	A. J. Wellington.	50	40	-	-	-	-	-
8	Richmond, . . .	238	Town, ¹ . . .	35	-	-	-	-	-	1 75
9	Russell, . . .	229	Town, . . .	30	-	-	-	-	-	1 75
10	Sandwich, . . .	222	Town, . . .	30	-	-	-	-	-	1 75
11	Shelburne, . . .	230	Town, . . .	35	-	-	-	-	-	1 75
12	Shrewsbury, . . .	194	Town, . . .	-	-	45	45	45	45	1 75
13	Somerset, . . .	231	Town, . . .	35	-	-	-	-	-	1 75
14	South Hadley, . . .	206	Town, . . .	30	-	-	-	-	-	1 75
15	Spencer, . . .	232	Town, . . .	35	-	-	-	-	-	1 50
16	Sterling, . . .	239	Town, . . .	-	-	30	30	45	50	1 75
17	Stoneham, . . .	273	Fred E. Ellis, .	75	65	-	-	-	-	1 00
18	Sturbridge, . . .	269	Bowlen & Whitaker.	35	35	-	-	-	-	1 75
19	Sudbury, . . .	257	A. J. Wellington.	30	40	-	-	-	-	3 00
20	Sunderland, . . .	240	Town, . . .	-	-	30	30	50	50	1 75
21	Townsend, . . .	213	Fred E. Ellis, .	30	40	-	-	-	-	3 00
22	Truro, . . .	-	- . .	-	-	-	-	-	-	-
23	Uxbridge, . . .	252	Asa Goddard, .	40	-	-	-	-	-	-
24	Walpole (North), . . .	244	John A. Whittemore's Sons.	25	-	-	-	-	-	-
25	Walpole (South), . . .	223	A. J. Wellington.	30	-	2 40	-	-	-	2 00
26	Ware, ³ . . .	-	- . .	-	-	-	-	-	-	-
27	Warren, . . .	200	Robert D. Maynard.	15	-	-	-	-	-	2 00
28	Wayland, . . .	241	Town, . . .	30	-	-	-	-	-	-
29	Wenham, . . .	242	A. J. Wellington.	30	35	-	-	-	-	-
30	Westborough, . . .	270	Town, . . .	40	-	-	-	-	-	1 75
31	West Boylston, . . .	274	C. H. Kelleher, .	22½	-	-	-	-	-	2 00
32	Westminster, . . .	195	Town, . . .	-	-	30	30	50	50	1 75

¹ \$525 to be deducted from total of contract.² Sub-grading.³ See Hardwick (New Braintree, Ware).

STATE ROADS DURING 1897 — *Continued.*

RUBBLE MASONRY.		Gravel.	Telford.	Shaping.	BROKEN STONE.		Vitrified Clay Pipe, 12 Inch.	Fencing.	Side Drains.	Cobble Gutters.	Bounds.	Catch-basins.	
Dry.	Cement.				Local.	Trap.							
Cubic Yard. \$3 00	Cubic Yard. \$6 00	Cubic Yard. \$0 60	Sq. Yard. \$0 35	Sq. Yard. \$0 02	Ton. \$1 70	Ton. \$2 10	Linear Foot. \$0 60	Linear Foot. \$0 15	Linear Foot. \$0 35	Sq. Yard. -	Each. \$1 25	Each. -	1
2 50	5 00	60	30	02	1 51	-	60	15	35	\$0 70	1 50	-	2
3 00	4 50	-	-	02	1 35	-	60	20	-	-	2 00	\$25 00	3
3 50	5 00	80	-	-	-	-	60	15	-	-	1 50	20 00	4
2 75	3 50	-	-	-	-	-	50	17	-	-	1 00	-	5
3 00	6 00	55	30	02	1 35	-	60	15	35	-	1 25	-	6
-	4 10 00	45	-	02	-	2 00	5 45	15	-	60	1 50	-	7
3 00	6 00	6 65	35	-	-	-	60	15	35	-	1 25	-	8
3 00	6 00	65	30	-	-	-	60	15	35	-	1 50	-	9
3 00	6 00	75	30	02	1 36	-	60	15	35	-	1 35	-	10
3 00	6 00	50	35	02	-	1 85	60	15	35	-	1 50	-	11
4 00	6 00	80	33	02	1 58	-	60	15	33	-	1 50	-	12
3 00	6 00	65	30	02	1 35	-	60	15	35	-	1 50	-	13
7 14 00	5 00	40	40	02	-	2 20	60	15	35	-	1 50	-	14
3 00	6 00	8 80	30	02	1 40	-	60	15	35	-	1 40	-	15
3 00	6 00	40	30	02	-	1 36	60	15	30	-	1 25	-	16
3 00	6 00	60	-	02	1 50	-	-	12	35	-	2 00	-	17
3 00	4 50	60	35	02	1 35	-	60	16	35	-	1 25	-	18
4 00	8 00	50	-	02	1 40	-	-	20	-	-	1 75	-	19
3 00	6 00	60	35	02	-	2 10	60	15	35	-	1 35	-	20
2 50	4 50	-	-	02	1 55	-	-	20	35	-	1 50	-	21
-	-	-	-	-	-	-	-	-	-	-	-	-	22
3 00	6 00	50	-	02	1 35	-	60	20	-	-	1 50	-	23
3 00	6 00	40	-	02	1 30	-	50	15	30	-	1 50	-	24
3 00	6 00	50	-	02	1 40	-	75	30	40	-	2 00	-	25
-	-	-	-	-	-	-	-	-	-	-	-	-	26
3 00	4 00	40	-	05	-	1 75	37	11	35	35	1 00	-	27
3 00	6 00	50	35	02	1 55	-	60	15	35	-	1 25	-	28
2 50	5 00	-	-	02	-	1 90	60	20	-	-	1 50	-	29
3 00	6 00	50	35	02	1 40	-	60	15	35	-	1 40	-	30
4 50	5 00	9 1 00	-	02	-	-	50	14	30	-	1 00	15 00	31
3 00	5 00	50	35	02	1 36	-	60	15	35	-	1 25	-	32

⁴ Brick inlets, each.⁵ Eight-inch pipe for inlets.⁶ Screened and rolled.⁷ Brick masonry, per M.⁸ Broken shale.⁹ Screened.

SHOWING CONTRACT PRICES ON

	TOWN OR CITY.	Number of Contract.	Contractor.	EXCAVATION.						Ledge Excavation.
				All Kinds.	Borrow.	Sand.	Gravel.	Hard-pan.	Clay.	
				Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.	Cubic Yard.
1	West Newbury, .	198	C. H. Kelleher, .	\$0 30	-	-	-	-	-	-
2	Westport, . .	207	Town, . .	40	-	-	-	-	-	\$1 75
3	West Tisbury, .	208	Town, . .	30	\$0 40	-	-	-	-	1 75
4	Weymouth, . .	209	Town, . .	35	-	-	-	-	-	1 75
5	Wilbraham, . .	224	W. N. Flynt Granite Co.	18	-	-	-	-	-	-
6	Williamsburg, .	-	-	-	-	-	-	-	-	-
7	Windsor, . . .	253	Town, . .	-	-	\$0 30	\$0 30	\$0 50	\$0 50	1 75
8	Worcester (Holden),	277	Edw'd E. Eames,	35	-	-	-	-	-	1 50
9	Worcester (Paxton),	214	City, . . .	-	-	35	35	50	50	1 75
10	Wrentham, . .	196	Town, . .	-	-	35	35	35	35	1 75
11	Yarmouth (4 S.), .	210	Town, . .	-	-	25	25	50	50	1 75
12	Yarmouth (5 S.), .	258	Town, . .	25	-	-	-	-	-	1 75
13	Yarmouth (bridge),	182	Town, . .	-	-	-	-	-	-	-
	Average of 94 contracts.	. . .	. . .	\$.321	\$.400	\$.314	\$.316	\$.437	\$.460	\$1.797

STATE ROADS DURING 1897 — *Concluded.*

RUBBLE MASONRY.		Gravel.	Telford.	Shaping.	BROKEN STONE.		Vitrified Clay Pipe, 12 Inch.	Fencing.	Side Drains.	Cobble Gutters.	Bounds.	Catch-basins.	
Dry.	Cement.				Local.	Trap.							
Cubic Yard. \$3 00	Cubic Yard. \$4 50	Cubic Yard. \$0 55	Sq. Yard. -	Sq. Yard. \$0 02	Ton. -	Ton. \$1 70	Linear Foot. -	Linear Foot. \$0 20	Linear Foot. \$0 27	Sq. Yard. -	Each. \$0 75	Each. -	
3 00	6 00	65	\$0 35	02	\$1 49	-	\$0 60	15	35	-	1 50	-	1
3 00	6 00	50	35	03	1 48	-	60	15	35	² \$80 00	1 40	-	3
3 00	6 00	50	35	02	1 85	-	60	15	35	-	1 50	-	4
-	5 00	-	-	02	-	1 85	60	-	-	-	1 50	-	5
-	-	-	-	-	-	-	-	-	-	-	-	-	6
3 00	6 00	³ 60 45	35	-	-	-	70	15	35	-	1 60	Cost	7
2 50	6 00	65	27	02	1 29	-	55	15	30	-	1 50	-	8
3 00	6 00	60	30	02	1 41	-	60	15	35	-	1 50	-	9
3 00	5 00	40	35	02	1 55	-	60	15	35	-	1 30	-	10
3 00	5 00	65	40	02	2 05	-	70	17	45	75	1 50	-	11
4 00	6 00	60	35	02	1 95	-	65	15	35	80	1 50	-	12
-	⁴ 8 50	-	-	-	-	-	-	35	-	-	-	-	13
\$3.133	\$5.770	\$.558	\$.339	\$.020	\$1.503	\$1.920	\$.598	\$.160	\$.345	\$.660	\$1.417	-	

¹ Surplus dust to be paid for at cost.² Grubbing.³ Screened and rolled.⁴ Yellow pine lumber, \$50 per M.; spruce, \$35 per M.; piling, 50 cents per foot; concrete foundation, \$5.50 per cubic yard.

APPENDIX D.

TABLE SHOWING THE AMOUNTS EXPENDED FOR REPAIRS AND MAINTENANCE TO JAN. 1, 1898.

TOWN OR CITY.	Year of Lay-out.	Expended in 1896.	Expended in 1897.	Total.
Andover,	1895	\$3 50	\$6 71	\$10 21
Andover,	1896	-	3 86	3 86
Ashby,	1894	-	49 77	49 77
Ashby,	1895	45 75	27 43	73 18
Ashby,	1896	-	1 39	1 39
Athol,	1895	-	446 63	446 63
Athol,	1896	-	687 76	687 76
Auburn,	1895	-	17 53	17 53
Auburn,	1896	-	137 34	137 34
Beverly,	1895	-	78 75	78 75
Brewster,	1895	-	124 39	124 39
Brewster,	1896	-	25 87	25 87
Buckland,	1894	-	28 23	28 23
Buckland,	1895	-	43 67	43 67
Buckland,	1896	-	23 92	23 92
Cottage City,	1894	15 00	125 06	140 06
Cottage City,	1895	-	321 86	321 86
Cottage City,	1896	-	2 23	2 23
Dalton,	1895	-	270 21	270 21
Dalton,	1896	-	99 50	99 50
Deerfield,	1894	-	94 38	94 38
Deerfield,	1895	105 00	3 19	108 19
Dennis,	1895	-	180 65	180 65
Dennis,	1896	-	70 89	70 89
Duxbury,	1894	171 63	26 36	197 99
Duxbury,	1895	6 61	58 70	65 31
Easthampton,	1895	-	61 01	61 01
Easthampton,	1896	-	27 13	27 13
Fairhaven,	1894	-	6 02	6 02
Fairhaven,	1895	-	2 71	2 71
Fitchburg,	1894	-	10 05	10 05
Fitchburg,	1895	-	23 04	23 04
Gloucester,	1894	47 00	40 03	87 03
Gloucester,	1895	-	15 61	15 61
Goshen,	1894	-	509 67	509 67
Goshen,	1895	-	151 74	151 74
Granby,	1894	268 16	121 53	389 69
Great Barrington,	1894	-	171 13	171 13
Great Barrington,	1896	-	4 76	4 76
Hadley,	1894	305 79	355 29	661 08
Hadley,	1895	275 99	400 45	676 44

AMOUNTS EXPENDED FOR REPAIRS, ETC. — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Expended in 1896.	Expended in 1897.	Total.
Hadley,	1896	—	\$2 47	\$2 47
Hancock,	1895	\$93 10	55 11	148 21
Hancock,	1896	—	3 07	3 07
Hingham,	1894	108 10	20 99	129 09
Hingham,	1896	—	91 89	91 89
Holbrook (Weymouth),	1894	—	52 93	52 93
Holbrook,	1896	—	17 05	17 05
Holden,	1894	234 25	196 12	430 37
Holden,	1895	—	94 64	94 64
Holden,	1896	—	3 86	3 86
Huntington,	1895	—	304 21	304 21
Huntington,	1896	—	4 35	4 35
Lee,	1894	10 00	31 55	41 55
Lee,	1895	—	22 26	22 26
Lee,	1896	—	3 01	3 01
Lexington,	1895	—	4 60	4 60
Lexington,	1896	—	3 98	3 98
Leicester,	1894	57 50	285 71	343 21
Leicester,	1895	293 96	804 40	1,098 36
Lincoln,	1895	21 08	23 82	44 90
Lincoln,	1896	—	8 54	8 54
Marion,	1894	—	20 62	20 62
Marion,	1895	—	2 89	2 89
Marshfield,	1894	3 50	15 30	18 80
Marshfield,	1896	—	2 95	2 95
Mattapoissett,	1894	—	6 02	6 02
Mattapoissett,	1895	3 83	96	4 79
Middleborough,	1894	—	5 24	5 24
Middleborough,	1895	—	53 45	53 45
Middleborough,	1896	—	28 37	28 37
Monson,	1894	—	150 79	150 79
Nantucket,	1894	10 83	262 36	273 19
Nantucket,	1895	—	207 17	207 17
Nantucket,	1895 ¹	—	182 36	182 36
Nantucket,	1896	—	41 38	41 38
Newburyport,	1896	—	6 86	6 86
Norfolk,	1895	—	22 41	22 41
North Adams,	1894	56 56	48 54	105 10
North Adams,	1896	—	3 62	3 62
North Attleborough,	1894	—	57 75	57 75
North Attleborough,	1895	—	8 06	8 06
Northampton,	1894	138 70	37 65	176 35
Norwood,	1895	27 70	3 63	31 38
Orange,	1894	—	78 54	78 54
Orange,	1895	—	544 37	544 37
Paxton,	1895 ²	36 02	561 96	597 98
Paxton,	1895 ³	19 14	134 86	154 00
Paxton,	1896	—	33 16	33 16
Pittsfield,	1894	162 62	95 19	257 81
Plymouth,	1894	91 20	60 45	151 69
Plymouth,	1895	30 40	33 82	64 22

¹ Extension.² No. 1.³ No. 2.

AMOUNTS EXPENDED FOR REPAIRS, ETC. — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Expended in 1896.	Expended in 1897.	Total.
Plymouth,	1896	—	\$85 74	\$85 74
Rehoboth,	1895	—	6 02	6 02
Rehoboth,	1896	—	3 31	3 31
Russell (Fairfield),	1894	\$650 95	144 79	795 74
Russell (Fairfield),	1896	—	10 68	10 68
Russell (Huntington),	1894	22 15	127 85	150 00
Russell (Huntington),	1895	—	245 85	245 85
Scituate,	1895	—	46 98	46 98
Shelburne,	1894	16 10	28 96	45 06
Shelburne,	1895	68 40	135 26	203 66
Shrewsbury,	1895	—	15 02	15 02
Shrewsbury,	1896	—	13 46	13 46
Somerset,	1895	—	5 18	5 18
South Hadley,	1895	—	123 75	123 75
Taunton,	1895	235 45	14 58	250 03
Taunton,	1896	—	358 25	358 25
Tisbury,	1894	18 84	208 59	227 43
Townsend,	1896	—	3 92	3 92
Truro,	1895	—	14 22	14 22
Tyngsborough,	1895	—	40 17	40 17
Tyngsborough,	1896	—	8 74	8 74
Walpole,	1894	16 00	26 02	42 02
Walpole,	1895	—	3 68	3 68
Wareham,	1896	—	8 43	8 43
Warren,	1896	—	6 15	6 15
Watertown,	1895	—	72 95	72 95
Watertown,	1896	—	54	54
Westfield,	1894	980 38	7 65	988 03
Westfield,	1896	—	3 43	3 43
Westminster,	1894	—	10 87	10 87
Westminster,	1895	7 50	36 85	44 35
Westminster,	1896	—	2 77	2 77
West Newbury,	1895	—	72 71	72 71
West Newbury,	1896	—	282 81	282 81
Westport,	1894	—	92 37	92 37
Westport,	1896	—	40 59	40 59
West Springfield,	1895	—	164 90	164 90
West Springfield,	1896	—	6 76	6 76
West Tisbury,	1895	—	66 72	66 72
West Tisbury,	1896	—	24 15	24 15
Weymouth,	1895	—	65 78	65 78
Weymouth,	1896	—	146 69	146 69
Whitman,	1894	—	17 61	17 61
Whitman,	1895	—	20 85	20 85
Whitman,	1896	—	5 26	5 26
Wilbraham,	1895	—	204 55	204 55
Wilbraham,	1896	—	17 55	17 55
Williamsburg,	1896	—	3 49	3 49
Williamstown,	1895	—	16 20	16 20
Williamstown,	1896	—	4 22	4 22

AMOUNTS EXPENDED FOR REPAIRS, ETC. — *Concluded.*

TOWN OR CITY.	Year of Lay-out.	Expended in 1896.	Expended in 1897.	Total.
Worcester,	1896	—	\$21 02	\$21 02
Wrentham,	1894	\$68 50	6 02	74 52
Wrentham,	1895	—	57 74	57 74
Yarmouth (North),	1894	—	18 77	18 77
Yarmouth (North),	1895	—	25 06	25 06
Yarmouth (North),	1896	—	53 41	53 41
Yarmouth (North),	1896 ¹	—	11 20	11 20
Yarmouth (South),	1895	—	244 14	244 14
Yarmouth (South),	1896	—	153 91	153 91
	—	\$4,727 19	\$13,266 93	\$17,994 12

¹ Extension.

APPENDIX E.

TABLE SHOWING TOWNS AND CITIES IN WHICH WORK HAS BEEN DONE DURING THE YEAR 1897, THE RESIDENT ENGINEERS ON SUCH WORK, TOGETHER WITH DATES OF BEGINNING AND ENDING OF WORK.

TOWN OR CITY.	County.	Lay-out.	Resident Engineer.	Date of Contract.	Date of Beginning.	Date of Ending.
Acushnet,	Bristol,	1897	Lyman, A. F.,	June 18, 1897,	Aug. 9, 1897,	Nov. 16, 1897.
Adams,	Berkshire,	1897	Murray, J. D.,	Sept. 2, 1897,	Sept. 10, 1897,	Dec. 4, 1897.
Ashby,	Middlesex,	1897	Brown, C. L.,	June 24, 1897,	July 26, 1897,	Oct. 28, 1897.
Ashfield,	Franklin,	1897	Nichols, E. J.,	Oct. 7, 1897,	Oct. 21, 1897,	Nov. 18, 1897.
Ashfield,	Franklin,	1897	Packard, S. G.,	Oct. 7, 1897,	Nov. 18, 1897,	Dec. 31, 1897.
Andover,	Essex,	1896	Wood, G. W.,	Oct. 8, 1896,	May 7, 1897,	July 9, 1897.
Andover,	Essex,	1897	Wood, G. W.,	June 18, 1897,	July 21, 1897,	July 30, 1897.
Andover,	Essex,	1897	Gerry, L. L.,	June 18, 1897,	July 30, 1897,	Oct. 16, 1897.
Andover,	Essex,	1897	Gerry, L. L.,	June 18, 1897,	Nov. 15, 1897,	Dec. 31, 1897.
Athol,	Worcester,	1895	Crosby, W. W.,	Aug. 7, 1895,	Sept. 23, 1897,	Dec. 31, 1897.
Auburn,	Worcester,	1897	Grimes, M. W.,	June 18, 1897,	July 26, 1897,	Aug. 14, 1897.
Auburn,	Worcester,	1897	Litchfield, S.,	June 18, 1897,	Aug. 16, 1897,	Dec. 4, 1897.
Barnstable,	Barnstable,	1897	Joyner, F. H.,	Aug. 26, 1897,	Dec. 9, 1897,	Dec. 24, 1897.
Barnstable,	Barnstable,	1897	Everett, P. H.,	Aug. 26, 1897,	Dec. 27, 1897,	Dec. 31, 1897.
Barre,	Worcester,	1897	Wyman, A. M.,	Sept. 2, 1897,	Sept. 16, 1897,	Dec. 8, 1897.
Bedford,	Middlesex,	1897	Winslow, G. R.,	Aug. 19, 1897,	Sept. 4, 1897,	Dec. 16, 1897.
Bourne,	Barnstable,	1897	Wheeler, R. C.,	Aug. 19, 1897,	Aug. 30, 1897,	Oct. 27, 1897.
Boxborough,	Middlesex,	1897	Bemis, E. W.,	Aug. 12, 1897,	Sept. 2, 1897,	Nov. 30, 1897.
Boxborough,	Middlesex,	1897	Grimes, M. W.,	Aug. 12, 1897,	Dec. 1, 1897,	Dec. 18, 1897.
Brewster,	Barnstable,	1896	Maynard, G. F.,	July 23, 1896,	May 10, 1897,	May 19, 1897.
Brewster (1),	Barnstable,	1897	Maynard, G. F.,	April 1, 1897,	May 10, 1897,	July 30, 1897.

Brewster (2),	.	.	.	1897	Maynard, G. F.,	May 27, 1897,	June 3, 1897,	July 31, 1897.
Brewster (3),	.	.	.	1897	Maynard, G. F.,	May 27, 1897,	June 3, 1897,	July 31, 1897.
Brimfield,	.	.	.	1897	Maynard, G. F.,	Sept. 23, 1897,	Nov. 1, 1897,	Dec. 31, 1897.
Brockton,	.	.	.	1897	Nickerson, E.,	July 29, 1897,	Aug. 25, 1897,	Oct. 28, 1897.
Brookfield,	.	.	.	1897	McCarthy, E. E.,	Sept. 16, 1897,	Oct. 4, 1897,	Dec. 4, 1897.
Buckland,	.	.	.	1896	Jones, L. H.,	Aug. 13, 1896,	June 15, 1897,	Sept. 11, 1897.
Buckland,	.	.	.	1897	Jones, L. H.,	July 8, 1897,	July 1, 1897,	Sept. 11, 1897.
Charlemont,	.	.	.	1897	Merrill, G. A.,	Sept. 2, 1897,	Sept. 18, 1897,	Dec. 13, 1897.
Chicopee,	.	.	.	1897	McLeod, T. M.,	Aug. 19, 1897,	Sept. 29, 1897,	Dec. 31, 1897.
Hampden,	.	.	.	1897	McLeod, T. M.,	Aug. 19, 1897,	Sept. 29, 1897,	Dec. 31, 1897.
Cohasset,	.	.	.	1897	McCart, F. W.,	Sept. 16, 1897,	Sept. 28, 1897,	Dec. 15, 1897.
Concord,	.	.	.	1897	Grover, O. L.,	July 29, 1897,	Sept. 7, 1897,	Nov. 13, 1897.
Cottage City,	.	.	.	1896	Crowell, J. H.,	July 23, 1896,	May 31, 1897,	July 3, 1897.
Dennis,	.	.	.	1897	Parsons, S. G.,	July 29, 1897,	Aug. 11, 1897,	Dec. 17, 1897.
Duxbury,	.	.	.	1897	Norton, C. H.,	Aug. 19, 1897,	Aug. 23, 1897,	Oct. 2, 1897.
Edgartown,	.	.	.	1897	Crowell, J. H.,	July 8, 1897,	Sept. 28, 1897,	Dec. 24, 1897.
Fitchburg,	.	.	.	1897	Winslow, D. H.,	Sept. 10, 1897,	Sept. 21, 1897,	Dec. 14, 1897.
Gardner,	.	.	.	1897	Packard, S. G.,	July 8, 1897,	July 30, 1897,	Nov. 12, 1897.
Grafton,	.	.	.	1897	Pillsbury, J. H.,	Aug. 5, 1897,	Sept. 3, 1897,	Nov. 27, 1897.
Great Barrington,	.	.	.	1896	Power, E. P.,	Sept. 24, 1896,	May 21, 1897,	June 10, 1897.
Great Barrington,	.	.	.	1897	Stuart, F. M.,	Sept. 10, 1897,	Oct. 18, 1897,	Dec. 4, 1897.
Great Barrington,	.	.	.	1897	Power, E. P.,	Sept. 10, 1897,	Dec. 6, 1897,	Dec. 31, 1897.
Hadley,	.	.	.	1897	Ruggles, E. F.,	July 22, 1897,	Aug. 6, 1897,	Sept. 11, 1897.
Hancock,	.	.	.	1896	Power, E. P.,	June 29, 1897,	July 14, 1897,	Nov. 4, 1897.
Hardwick,	.	.	.	1897	Nickerson, E.,	Sept. 30, 1897,	Nov. 11, 1897,	Dec. 15, 1897.
Hingham,	.	.	.	1896	McCart, F. W.,	Aug. 27, 1896,	Oct. 25, 1897,	Dec. 11, 1897.
Hingham,	.	.	.	1897	McCart, F. W.,	Aug. 12, 1897,	Aug. 31, 1897,	Dec. 11, 1897.
Holbrook,	.	.	.	1896	Belknap, F. W.,	Oct. 22, 1896,	May 14, 1897,	June 5, 1897.
Holbrook,	.	.	.	1896	Warren, H. E.,	Sept. 24, 1896,	May 12, 1897,	June 23, 1897.
Holden,	.	.	.	1897	Warren, H. E.,	July 8, 1897,	June 24, 1897,	July 10, 1897.
Holden (Bridge),	.	.	.	1897	Warren, H. E.,	June 18, 1897,	July 12, 1897,	Aug. 19, 1897.
Holden,	.	.	.	1897	Warren, H. E.,	July 18, 1897,	May 26, 1897,	Aug. 17, 1897.
Huntington,	.	.	.	1896	Norton, C. E.,	July 30, 1896,	May 26, 1897,	Aug. 17, 1897.
Lawrence,	.	.	.	1896	Belknap, F. W.,	Oct. 29, 1896,	June 14, 1897,	July 30, 1897.

TABLE SHOWING TOWNS AND CITIES IN WHICH WORK HAS BEEN DONE, ETC. — *Continued.*

TOWN OR CITY.	County.	Lay-out.	Resident Engineer.	Date of Contract.	Date of Beginning.	Date of Ending.
Lawrence, . . .	Essex, . . .	1896	Wood, G. W., . .	Oct. 29, 1896,	July 30, 1897,	Aug. 9, 1897.
Leicester, . . .	Worcester, . .	1896	Williams, C. G., .	July 16, 1896,	May 19, 1897,	Aug. 18, 1897.
Leicester, . . .	Worcester, . .	1896	McCarthy, E. E., .	July 16, 1896,	Sept. 10, 1897,	Oct. 2, 1897.
Lexington, . .	Middlesex, . .	1897	Belknap, F. W., .	July 8, 1897,	Aug. 11, 1897,	Oct. 23, 1897.
Lincoln, . . .	Middlesex, . .	1897	Lovering, G. G., .	June 18, 1897,	Aug. 17, 1897,	Sept. 14, 1897.
Lincoln, . . .	Middlesex, . .	1897	Wason, H. B., . .	June 18, 1897,	Sept. 13, 1897,	Oct. 22, 1897.
Lowell (Boulevard), .	Middlesex, . .	1897	Everett, P. H., . .	July 8, 1897,	July 23, 1897,	Oct. 9, 1897.
Lowell (Princeton Street),	Middlesex, . .	1897	Everett, P. H., . .	July 29, 1897,	Sept. 27, 1897,	Dec. 14, 1897.
Marion, . . .	Plymouth, . .	1897	Bemis, E. W., . .	July 29, 1897,	Aug. 10, 1897,	Sept. 15, 1897.
Marion, . . .	Plymouth, . .	1897	Gray, A. W., . .	July 29, 1897,	Sept. 15, 1897,	Oct. 14, 1897.
Marlborough (East),	Middlesex, . .	1897	Welton, C. A., . .	Sept. 10, 1897,	Oct. 19, 1897,	Dec. 22, 1897.
Marlborough (West),	Middlesex, . .	1897	Wason, H. B., . .	Oct. 14, 1897,	Nov. 10, 1897,	Dec. 22, 1897.
Marshfield, . .	Plymouth, . .	1896	Winslow, D. H., .	July 30, 1896,	May 17, 1897,	May 28, 1897.
Merrimac, . . .	Essex, . . .	1897	Dadley, A. D., . .	Sept. 2, 1897,	Sept. 27, 1897,	Dec. 31, 1897.
Methuen, . . .	Essex, . . .	1896	Belknap, F. W., .	Oct. 29, 1896,	June 15, 1897,	July 30, 1897.
Methuen, . . .	Essex, . . .	1896	Wood, G. W., . .	Oct. 29, 1896,	July 30, 1897,	Oct. 30, 1897.
Middleborough, . .	Plymouth, . .	1897	Welton, C. A., . .	July 29, 1897,	Aug. 9, 1897,	Oct. 16, 1897.
Nantucket, . . .	Nantucket, . .	1896	Murray, J. D., . .	Nov. 5, 1896,	Jan. 1, 1897,	Jan. 16, 1897.
Nantucket, . . .	Nantucket, . .	1896-7	Joyner, F. H., . .	Oct. 28, 1897,	Dec. 28, 1897,	Dec. 31, 1897.
New Braintree, . .	Worcester, . .	1897	Nickerson, E., . .	Sept. 30, 1897,	Nov. 10, 1897,	Dec. 15, 1897.
Newburyport, . .	Essex, . . .	1896	Brown, C. L., . .	Oct. 1, 1896,	May 14, 1897,	June 28, 1897.
Newburyport, . .	Essex, . . .	1896	Dadley, A. D., . .	Oct. 1, 1896,	July 24, 1897,	July 30, 1897.
Newburyport, . .	Essex, . . .	1896	Southworth, A. L.,	Oct. 1, 1896,	Nov. 15, 1897,	Dec. 23, 1897.
Newburyport, . .	Essex, . . .	1897	Dadley, A. D., . .	Oct. 1, 1896,	Aug. 24, 1897,	Sept. 25, 1897.
Norfolk (Con. 164), .	Norfolk, . .	1895	Shaw, S., . . .	Sept. 24, 1896,	May 7, 1897,	July 9, 1897.
Norfolk (Con. 264), .	Norfolk, . .	1895	Shaw, S., . . .	Sept. 30, 1897,	Aug. 7, 1897,	Dec. 7, 1897.
North Adams, . .	Berkshire, . .	1896	Murray, J. D., . .	Aug. 27, 1896,	June 2, 1897,	July 31, 1897.

North Adams,	1897	Murray, J. D.,	Aug. 27, 1896,	Aug. 2, 1897,	Sept. 11, 1897.
Northampton,	1897	Ruggles, E. F.,	July 15, 1897,	Sept. 20, 1897,	Nov. 20, 1897.
North Attleborough,	1896	Wason, H. B.,	Sept. 19, 1896,	May 12, 1897,	June 8, 1897.
North Attleborough,	1897	Gerry, L. L.,	Sept. 2, 1897,	Nov. 4, 1897,	Nov. 13, 1897.
North Attleborough,	1897	Wheeler, R. C.,	Sept. 2, 1897,	Nov. 13, 1897,	Nov. 27, 1897.
North Attleborough,	1897	Farnham, A. B.,	Sept. 2, 1897,	Nov. 29, 1897,	Dec. 18, 1897.
North Attleborough,	1897	Hammersley, W. P.,	Sept. 2, 1897,	Dec. 20, 1897,	Dec. 31, 1897.
Northborough,	1897	Southworth, A. L.,	Sept. 16, 1897,	Oct. 18, 1897,	Oct. 26, 1897.
Northborough,	1897	Wason, H. B.,	Sept. 16, 1897,	Oct. 26, 1897,	Dec. 22, 1897.
North Reading,	1897	Gerry, L. L.,	June 18, 1897,	Aug. 7, 1897,	Dec. 22, 1897.
North Reading,	1897	Gerry, L. L.,	June 18, 1897,	Nov. 15, 1897,	Oct. 16, 1897.
Norwood,	1897	Cutter, F. P.,	Sept. 2, 1897,	Sept. 28, 1897,	Dec. 31, 1897.
Orange,	1897	Wason, H. B.,	Aug. 5, 1897,	July 10, 1897,	Dec. 24, 1897.
Paxton,	1897	Grimes, M. W.,	June 18, 1897,	Sept. 16, 1897,	Sept. 11, 1897.
Phillipston,	1897	Frink, H. A.,	Sept. 30, 1897,	Oct. 11, 1897,	Nov. 27, 1897.
Phillipston,	1897	Niekerson, E.,	Sept. 30, 1897,	Dec. 22, 1897,	Dec. 20, 1897.
Pittsfield,	1897	Power, E. P.,	Sept. 2, 1897,	Sept. 21, 1897,	Sept. 30, 1897.
Pittsfield,	1897	Shepardson, E. W.,	Sept. 2, 1897,	Sept. 30, 1897,	Nov. 15, 1897.
Pittsfield,	1897	Jones, L. H.,	Sept. 2, 1897,	Nov. 15, 1897,	Nov. 26, 1897.
Plymouth,	1896	Niekerson, E.,	Oct. 22, 1896, } Dec. 10, 1896, }	Jan. 1, 1897,	July 17, 1897.
Plymouth,	1897	Warren, H. E.,	Nov. 4, 1897,	Nov. 15, 1897,	Dec. 31, 1897.
Princeton,	1897	Holden, H. C.,	Aug. 19, 1897,	Sept. 7, 1897,	Oct. 16, 1897.
Rehoboth,	1896	Warren, H. E.,	July 9, 1896,	Aug. 30, 1897,	Nov. 6, 1897.
Revere,	1897	Hall, H. A.,	Nov. 26, 1897,	Dec. 8, 1897,	Dec. 31, 1897.
Richmond,	1897	Gannet, C. H.,	Aug. 19, 1897,	Sept. 25, 1897,	Nov. 5, 1897.
Richmond,	1897	Power, E. P.,	Aug. 19, 1897,	Nov. 5, 1897,	Dec. 4, 1897.
Russell,	1896	Pierce, J. W.,	Sept. 1, 1896,	May 13, 1897,	June 18, 1897.
Russell,	1896	Hammersley, W. P.,	Sept. 1, 1896,	June 19, 1897,	Nov. 10, 1897.
Russell,	1897	Hammersley, W. P.,	Aug. 12, 1897,	Aug. 28, 1897,	Nov. 30, 1897.
Sandwich,	1897	Maynard, G. F.,	July 29, 1897,	Aug. 12, 1897,	Oct. 19, 1897.
Seituate,	1894	Litchfield, S.,	Sept. 24, 1896,	June 23, 1897,	Aug. 14, 1897.

TABLE SHOWING TOWNS AND CITIES IN WHICH WORK HAS BEEN DONE, ETC. — *Concluded.*

TOWN OR CITY.	County.	Lay-out.	Resident Engineer.	Date of Contract.	Date of Beginning.	Date of Ending.
Shelburne, .	Franklin, .	1896	Jones, L. H., .	July 9, 1896,	Sept. 13, 1897,	Nov. 13, 1897.
Shelburne, .	Franklin, .	1897	Jones, L. H., .	Aug. 12, 1897,	Sept. 13, 1897,	Nov. 13, 1897.
Shrewsbury, .	Worcester, .	1896	Cutter, F. P., .	Aug. 13, 1896,	July 12, 1897,	Sept. 18, 1897.
Shrewsbury, .	Worcester, .	1897	Cutter, F. P., .	June 18, 1897,	July 12, 1897,	Sept. 18, 1897.
Somerset, .	Bristol, .	1897	Hall, H. A., .	Aug. 12, 1897,	Aug. 30, 1897,	Dec. 4, 1897.
South Hadley, .	Hampshire, .	1897	Hewes, L. I., .	July 8, 1897,	Sept. 7, 1897,	Nov. 16, 1897.
Sterling, .	Worcester, .	1897	Kimball, J. W., .	Aug. 19, 1897,	Sept. 13, 1897,	Nov. 13, 1897.
Sterling, .	Worcester, .	1897	Grover, O. L., .	Aug. 19, 1897,	Nov. 16, 1897,	Dec. 4, 1897.
Stoneham, .	Middlesex, .	1897	Wood, G. W., .	Oct. 21, 1897,	Nov. 1, 1897,	Dec. 31, 1897.
Sturbridge, .	Worcester, .	1897	Gray, A. W., .	Oct. 7, 1897,	Oct. 22, 1897,	Dec. 11, 1897.
Sudbury, .	Middlesex, .	1897	Welton, C. A., .	Sept. 10, 1897,	Oct. 19, 1897,	Dec. 22, 1897.
Sunderland, .	Franklin, .	1897	Brown, C. L., .	Aug. 19, 1897,	Oct. 29, 1897,	Dec. 11, 1897.
Townsend, .	Middlesex, .	1896	Wheeler, R. C., .	Oct. 15, 1896,	May 2, 1897,	Aug. 20, 1897.
Townsend, .	Middlesex, .	1897	Wheeler, R. C., .	July 15, 1897,	July 26, 1897,	Aug. 20, 1897.
Truro, .	Barnstable, .	1895	Joyner, F. H., .	Oct. 8, 1896,	Jan. 1, 1897,	June 1, 1897.
Tyngsborough, .	Middlesex, .	1896	Peabody, W. W., .	Aug. 27, 1896,	May 14, 1897,	June 14, 1897.
Tyngsborough, .	Middlesex, .	1896	Everett, P. H., .	Aug. 27, 1896,	May 14, 1897,	June 14, 1897.
Uxbridge, .	Worcester, .	1897	Hitchcock, A. W., .	Sept. 2, 1897,	Oct. 14, 1897,	July 27, 1897.
Walpole, .	Norfolk, .	1896	Winslow, D. H., .	Aug. 19, 1896,	June 10, 1897,	June 12, 1897.
Walpole (North), .	Norfolk, .	1897	Shepardson, A. W., .	Aug. 26, 1897,	Sept. 14, 1897,	Sept. 28, 1897.
Walpole (North), .	Norfolk, .	1897	Cutter, F. P., .	Aug. 26, 1897,	Sept. 28, 1897,	Nov. 18, 1897.
Walpole (South), .	Norfolk, .	1897	Shaw, S., .	July 29, 1897,	Aug. 3, 1897,	Nov. 22, 1897.
Ware, .	Hampshire, .	1897	Nickerson, E., .	Sept. 30, 1897,	Nov. 1, 1897,	Dec. 11, 1897.
Ware, .	Hampshire, .	1897	Shepardson, E. W., .	Sept. 30, 1897,	Nov. 17, 1897,	Dec. 8, 1897.
Warren, .	Worcester, .	1896	McLeod, T. M., .	Aug. 19, 1896,	July 12, 1897,	Sept. 25, 1897.
Warren, .	Worcester, .	1897	McLeod, T. M., .	July 2, 1897,	July 12, 1897,	Sept. 25, 1897.
Wayland, .	Middlesex, .	1897	Lovering, G. G., .	Aug. 19, 1897,	Oct. 4, 1897,	Oct. 22, 1897.

Wayland,	Middlesex,	1897	Lovering, G. G.,	Aug. 19, 1897,	Nov. 20, 1897,	Dec. 4, 1897.
Wenham,	Essex,	1897	Davis, W. E.,	Aug. 19, 1897,	Sept. 10, 1897,	Dec. 9, 1897.
Westborough,	Worcester,	1897	Holden, H. C.,	Oct. 7, 1897,	Oct. 21, 1897,	Dec. 24, 1897.
Westminster,	Worcester,	1896	Winslow, D. H.,	Oct. 1, 1896,	June 24, 1897,	Sept. 11, 1897.
Westminster,	Worcester,	1897	Winslow, D. H.,	June 18, 1897,	June 24, 1897,	Oct. 16, 1897.
West Newbury,	Essex,	1896	Dadley, A. D.,	Aug. 27, 1896,	May 24, 1897,	July 30, 1897.
West Newbury,	Essex,	1896	Southworth, A. L.,	Aug. 27, 1896,	Nov. 15, 1897,	Dec. 23, 1897.
West Newbury,	Essex,	1897	Dadley, A. D.,	June 24, 1897,	Aug. 3, 1897,	Oct. 10, 1897.
Westport,	Bristol,	1897	King, G. A.,	July 8, 1897,	Aug. 10, 1897,	Nov. 23, 1897.
West Tisbury,	Dukes,	1896	Crowell, J. H.,	July 30, 1897,	July 21, 1897,	Sept. 8, 1897.
West Tisbury,	Norfolk,	1897	Crowell, J. H.,	July 8, 1897,	July 8, 1897,	Aug. 28, 1897.
Weymouth,	Norfolk,	1895	Norton, C. H.,	Aug. 13, 1896,	Oct. 4, 1897,	Dec. 18, 1897.
Weymouth,	Norfolk,	1897	Norton, C. H.,	July 8, 1897,	Oct. 4, 1897,	Dec. 18, 1897.
Wilbraham,	Hampden,	1896	Frink, H. A.,	Aug. 19, 1896,	Aug. 17, 1897,	Oct. 7, 1897.
Wilbraham,	Hampden,	1897	Frink, H. A.,	July 29, 1897,	Aug. 17, 1897,	Oct. 7, 1897.
Williamstown,	Hampshire,	1896	Ruggles, E. F.,	Aug. 20, 1896,	May 26, 1897,	Sept. 11, 1897.
Williamstown,	Hampshire,	1897	Murray, J. D.,	Aug. 13, 1896,	May 24, 1897,	Sept. 8, 1897.
Windsor,	Berkshire,	1897	Farnham, A. B.,	Sept. 2, 1897,	Oct. 13, 1897,	Nov. 22, 1897.
Windsor,	Berkshire,	1897	Ruggles, E. F.,	Sept. 2, 1897,	Nov. 22, 1897,	Dec. 31, 1897.
Worcester,	Worcester,	1896	Grimes, M. W.,	July 16, 1896,	May 14, 1897,	July 9, 1897.
Worcester,	Worcester,	1897	Grimes, M. W.,	July 8, 1897,	Aug. 23, 1897,	Sept. 15, 1897.
Wrentham,	Norfolk,	1897	Welton, C. A.,	June 18, 1897,	July 28, 1897,	Aug. 2, 1897.
Wrentham,	Norfolk,	1897	Shaw, S.,	June 18, 1897,	Aug. 2, 1897,	Dec. 11, 1897.
Yarmouth (South, 3),	Barnstable,	1896	Everett, P. H.,	Aug. 27, 1896,	May 13, 1897,	June 3, 1897.
Yarmouth (South, 3),	Barnstable,	1896	Joyner, F. H.,	Aug. 27, 1896,	June 4, 1897,	Dec. 11, 1897.
Yarmouth (Bridge),	Barnstable,	1896	Joyner, F. H.,	May 27, 1897,	June 7, 1897,	Oct. 18, 1897.
Yarmouth (South, 4),	Barnstable,	1897	Joyner, F. H.,	July 8, 1897,	July 19, 1897,	Dec. 11, 1897.
Yarmouth (South, 5),	Barnstable,	1897	Joyner, F. H.,	Sept. 10, 1897,	Sept. 16, 1897,	Dec. 11, 1897.

APPENDIX F.

LIST OF COMPLETED ROADS, SHOWING DATES OF
FINAL APPROVAL OF WORK DONE UNDER CON-
TRACTS FOR CONSTRUCTION.

CITY OR TOWN.	Year of Lay-out.	Number of Contract.	Contractor.	Date of Approval of Work done under Contracts.
Andover, . . .	1895	47	Town, . . .	June 3, 1897.
Andover, . . .	1896	169	A. J. Wellington,	July 29, 1897.
Ashby, . . .	1894	2	Town, . . .	Aug. 6, 1896.
Ashby, . . .	1895	49	Town, . . .	Aug. 6, 1896.
Ashby, . . .	1896	109	Town, . . .	Nov. 18, 1897.
Athol, . . .	1895	70	Town, . . .	June 3, 1897.
Auburn, . . .	1895	71	Town, . . .	Aug. 6, 1896.
Auburn, . . .	1896	148	Town, . . .	Nov. 18, 1897.
Beverly, . . .	1895	106	City, . . .	Nov. 19, 1896.
Bourne, . . .	1897	234	W. H. Mague, . .	Dec. 23, 1897.
Brewster, . . .	1895	82	Town, . . .	Nov. 19, 1896.
Brewster, . . .	1896	124	Town, . . .	Nov. 19, 1896.
Brewster, . . .	1897	179	Town, . . .	Aug. 12, 1897.
Brewster, . . .	1897	181	Town, . . .	Aug. 12, 1897.
Buckland, . . .	1894	27	Town, . . .	Aug. 6, 1896.
Buckland, . . .	1895	72	Town, . . .	Nov. 18, 1897.
Buckland, . . .	1896	133	Town, . . .	Nov. 18, 1897.
Buckland, . . .	1897	201	Town, . . .	Oct. 21, 1897.
Cottage City, . . .	1894	14	Town, . . .	Aug. 6, 1896.
Cottage City, . . .	1895	44-134	Town, . . .	Nov. 18, 1897.
Cottage City, . . .	1896	123	Town, . . .	Nov. 18, 1897.
Dalton, . . .	1895	63	Town, . . .	Nov. 18, 1897.
Dalton, . . .	1896	118	Town, . . .	Nov. 18, 1897.
Deerfield, . . .	1894	108	Town, . . .	Nov. 28, 1896.
Deerfield, . . .	1895	73	Town, . . .	Aug. 6, 1896.
Dennis, . . .	1895	53	Town, . . .	Nov. 19, 1896.
Dennis, . . .	1896	161	Town, . . .	Nov. 18, 1897.
Dennis, . . .	1897	218	Town, . . .	Dec. 30, 1897.
Duxbury, . . .	1894	33	Town, . . .	Aug. 6, 1896.
Duxbury, . . .	1895	50	Town, . . .	Aug. 6, 1896.
Duxbury, . . .	1897	236	Town, . . .	Oct. 2, 1897.
Easthampton, . . .	1895	83	Town, . . .	Nov. 28, 1896.
Easthampton, . . .	1896	125	Town, . . .	Nov. 28, 1896.
Fairhaven, . . .	1894	21	Town, . . .	Aug. 6, 1896.
Fairhaven, . . .	1895	64	Town, . . .	Aug. 6, 1896.
Fitchburg, . . .	1894	4	City, . . .	June 18, 1895.
Fitchburg, . . .	1895	100	City, . . .	Nov. 18, 1897.
Gloucester, . . .	1894	39	City, . . .	Aug. 6, 1896.
Gloucester, . . .	1895	147	T. Stuart & Son,	Sept. 10, 1897.
Goshen, . . .	1894	10	Town, . . .	Aug. 6, 1896.

LIST OF COMPLETED ROADS, ETC. — *Continued.*

CITY OR TOWN.	Year of Lay-out.	Number of Contract.	Contractor.	Date of Approval of Work done under Contracts.
Goshen, . . .	1895	84	Town, . . .	Nov. 18, 1897.
Granby, . . .	1894	31	Town, . . .	Aug. 6, 1896.
Great Barrington, . . .	1894	23	Town, . . .	Aug. 6, 1896.
Great Barrington, . . .	1896	162	Town, . . .	Aug. 12, 1897.
Hadley, . . .	1894	15	Town, . . .	Aug. 6, 1896.
Hadley, . . .	1895	74	Town, . . .	Aug. 6, 1896.
Hadley, . . .	1896	135	Town, . . .	Nov. 28, 1896.
Hadley, . . .	1897	215	A. J. Wellington,	Sept. 30, 1897.
Hancock, . . .	1895	97	Hendrick, Taylor & Warner.	Oct. 22, 1896.
Hancock, . . .	1896	199	Lathrop & Shea,	Dec. 16, 1897.
Hingham, . . .	1894	26	Town, . . .	Aug. 6, 1896.
Holbrook, . . .	1894	90	W. T. Davis, . . .	June 3, 1897.
Holbrook, . . .	1896	173	Duncan Rusk, . . .	Aug. 12, 1897.
Holden, . . .	1894	16-25	Town, . . .	Aug. 6, 1896.
Holden, . . .	1895	75	Town, . . .	Aug. 6, 1896.
Holden, . . .	1896	163	Town, . . .	Nov. 18, 1897.
Holden, . . .	1897	189-204	Town, . . .	Oct. 21, 1897.
Huntington, . . .	1895	55	Town, . . .	June 3, 1897.
Lee, . . .	1894	20-54	Town, . . .	Aug. 6, 1896.
Lee, . . .	1895	99	Town, . . .	Aug. 6, 1896.
Lee, . . .	1896	150	F. T. Ley & Co.,	June 24, 1897.
Leicester, . . .	1894	5-24-42	Town, . . .	Aug. 6, 1896.
Leicester, . . .	1895	48	Town, . . .	June 3, 1897.
Lexington, . . .	1895	66	Town, . . .	June 3, 1897.
Lexington, . . .	1896	110	Town, . . .	June 3, 1897.
Lincoln, . . .	1895	65	Town, . . .	Aug. 6, 1896.
Lincoln, . . .	1896	115	Town, . . .	July 22, 1897.
Lowell (Boulevard), . . .	1897	211	A. J. Wellington,	Dec. 16, 1897.
Marion, . . .	1894	3	Town, . . .	Aug. 6, 1896.
Marion, . . .	1895	67	Town, . . .	June 3, 1897.
Marshfield, . . .	1894	28	Town, . . .	Aug. 6, 1896.
Marshfield, . . .	1896	128	Town, . . .	Nov. 18, 1897.
Mattapoissett, . . .	1894	19	Town, . . .	Aug. 6, 1896.
Mattapoissett, . . .	1895	76	Town, . . .	Aug. 6, 1896.
Middleborough, . . .	1894	29	Town, . . .	Aug. 6, 1896.
Middleborough, . . .	1895	51	Town, . . .	June 3, 1897.
Middleborough, . . .	1896	- ¹	Town, . . .	June 3, 1897.
Monson, . . .	1894	52	Town, . . .	Aug. 6, 1896.
Nantucket, . . .	1894	9	Town, . . .	July 23, 1896.
Nantucket, . . .	1895	85-107	Town, . . .	July 23, 1896.
Newburyport, . . .	1896	167	C. H. Kelleher, . . .	Oct. 28, 1897.
Newburyport, . . .	1897	167	C. H. Kelleher, . . .	Oct. 28, 1897.
Norfolk, . . .	1895	93 ²	Hendrick, Taylor & Warner.	Nov. 12, 1896.
Norfolk, . . .	1895	164 ³	Town, . . .	Nov. 18, 1897.
North Adams, . . .	1894	40	City, . . .	Aug. 6, 1896.
North Adams, . . .	1896	151	M. R. Fisk, . . .	Sept. 16, 1897.
North Adams, . . .	1897	151	M. R. Fisk, . . .	Sept. 16, 1897.
Northampton, . . .	1894	12	City, . . .	Nov. 28, 1896.
North Attleborough, . . .	1894	8	Town, . . .	Aug. 6, 1896.

¹ 126 north, 136 south.² Grading.³ Stone.

LIST OF COMPLETED ROADS, ETC. — *Continued.*

CITY OR TOWN.	Year of Lay-out.	Number of Contract.	Contractor.	Date of Approval of Work done under Contracts.
North Attleborough, .	1895	77	Town, . .	Aug. 6, 1896.
Orange, . . .	1894	32	Town, . .	Nov. 18, 1897.
Orange, . . .	1895	56	Town, . .	Nov. 18, 1897.
Paxton, . . .	1895	41	Town, . .	June 18, 1897.
Paxton, . . .	1895	62	Town, . .	Aug. 6, 1896.
Paxton, . . .	1896	111	Town, . .	June 3, 1897.
Pittsfield, . . .	1894	17	City, . .	Aug. 6, 1896.
Plymouth, . . .	1894	35	Town, . .	Aug. 6, 1896.
Plymouth, . . .	1895	43	Town, . .	Aug. 6, 1896.
Plymouth, . . .	1896	174	Andrew Carberry.	Aug. 12, 1897.
Plymouth, . . .	1896	178	J. A. Whittemore's Sons.	Aug. 12, 1897.
Princeton, . . .	1897	237	Town, . .	Nov. 11, 1897.
Rehoboth, . . .	1895	86	Town, . .	June 3, 1897.
Rehoboth, . . .	1896	116	Town, . .	June 3, 1897.
Russell (Fairfield), .	1894	22	Town, . .	Aug. 6, 1896.
Russell (Fairfield), .	1896	120	Town, . .	June 3, 1897.
Russell (Fairfield), .	1896	158	Town, . .	June 3, 1897.
Russell (Huntington), .	1894	11	Town, . .	Aug. 6, 1896.
Russell (Huntington), .	1895	58	Town, . .	June 3, 1897.
Sandwich, . . .	1897	222	Town, . .	Dec. 16, 1897.
Scituate, . . .	1895	68	Town, . .	June 3, 1897.
Shelburne, . . .	1894	36	Town, . .	Aug. 6, 1896.
Shelburne, . . .	1895	57	Town, . .	Aug. 6, 1896.
Shrewsbury, . . .	1895	78	Town, . .	June 3, 1897.
Shrewsbury (1st), . .	1896	137	Town, . .	June 3, 1897.
Shrewsbury (2d), . .	1896	137	Town, . .	Nov. 18, 1897.
Somerset, . . .	1895	69	Town, . .	June 3, 1897.
South Hadley, . . .	1895	153	F. T. Ley & Co.,	May 6, 1897.
Taunton, . . .	1895	91	City, . .	Aug. 6, 1896.
Taunton, . . .	1896	121	City, . .	June 3, 1897.
Tisbury, . . .	1894	7	Town, . .	Aug. 6, 1896.
Townsend, . . .	1896	171	F. E. Ellis, .	Sept. 10, 1897.
Townsend, . . .	1897	213	F. E. Ellis, .	Sept. 10, 1897.
Truro, . . .	1895	170	A. J. Wellington,	Nov. 18, 1897.
Tyngsborough, . . .	1895	101-87	Town, . .	May 6, 1897.
Tyngsborough, . . .	1896	154	Town, . .	Nov. 18, 1897.
Walpole, . . .	1894	30	Town, . .	Aug. 6, 1896.
Walpole, . . .	1895	140	J. S. Lane & Son,	June 24, 1897.
Walpole (South), . .	1897	223	A. J. Wellington,	Nov. 4, 1897.
Wareham, . . .	1896	112	Town, . .	June 3, 1897.
Warren, . . .	1896	141	W. N. Flynt Granite Co.	Sept. 30, 1897.
Warren, . . .	1897	200	R. D. Maynard, .	Sept. 30, 1897.
Watertown, . . .	1895	80	Town, . .	June 3, 1897.
Watertown, . . .	1896	143	Town, . .	June 3, 1897.
Westfield, . . .	1894	6	Town, . .	Aug. 6, 1896.
Westfield, . . .	1896	159	Town, . .	Dec. 17, 1896.
Westminster, . . .	1894	13	Town, . .	Aug. 6, 1896.
Westminster, . . .	1895	59	Town, . .	June 3, 1897.

LIST OF COMPLETED ROADS, ETC. — *Concluded.*

CITY OR TOWN.	Year of Lay-out.	Number of Contract.	Contractor.	Date of Approval of Work done under Contracts.
Westminster, . . .	1896	145-168	Town—Asa Goddard.	Sept. 10, 1897.
West Newbury, . . .	1895	98	C. H. Kelleher, .	Aug. 6, 1896.
West Newbury, . . .	1896	155	T. Stuart & Son,	Sept. 10, 1897.
West Newbury, . . .	1897	198	C. H. Kelleher, .	Oct. 28, 1897.
Westport, . . .	1894	34	Town, . . .	June 3, 1897.
West Springfield, . . .	1895	104	Town, . . .	Nov. 19, 1896.
West Springfield, . . .	1896	166	Town, . . .	Nov. 19, 1896.
West Tisbury, . . .	1895	45	Town, . . .	June 3, 1897.
West Tisbury, . . .	1896	129	Town, . . .	Sept. 30, 1897.
West Tisbury, . . .	1897	208	Town, . . .	Sept. 30, 1897.
Weymouth, . . .	1894	90	W. T. Davis, .	June 3, 1897.
Weymouth, . . .	1895	89	Town, . . .	June 3, 1897.
Wilbraham, . . .	1895	105	M. R. Fisk, .	July 16, 1896.
Wilbraham, . . .	1897	224	W. N. Flynt Granite Co.	Dec. 16, 1897.
Williamsburg, . . .	1896	146	Town, . . .	Sept. 30, 1897.
Williamstown, . . .	1895	81	Town, . . .	Sept 16, 1897.
Williamstown, . . .	1896	139	Town, . . .	Sept. 16, 1897.
Worcester, . . .	1896	122	City, . . .	Oct. 27, 1897.
Worcester, . . .	1897	214	City, . . .	Oct. 27, 1897.
Wrentham, . . .	1894	18	Town, . . .	Aug. 6, 1896.
Wrentham, . . .	1895	61	Town, . . .	Aug. 6, 1896.
Yarmouth (North), . . .	1894	38	Town, . . .	Aug. 6, 1896.
Yarmouth (North), . . .	1895	60	Town, . . .	Aug. 6, 1896.
Yarmouth (North), . . .	1896	114-160	Town, . . .	July 8, 1897.
Yarmouth (South), . . .	1895	92	Town, . . .	Oct. 22, 1896.
Yarmouth (South), . . .	1896	156-182	Town, . . .	Dec. 23, 1897.
Yarmouth (South), . . .	1897	210	Town, . . .	Dec. 23, 1897.
Yarmouth (South), . . .	1897	258	Town, . . .	Dec. 23, 1897.

APPENDIX G.

REPORT OF GEOLOGIST, INCLUDING A TABLE SHOWING LABORATORY EXPERIMENTS ON ROAD-BUILDING STONES.

To the Massachusetts Highway Commission.

GENTLEMEN : — I herewith submit a report of the work done at the laboratory of the commission, at the Lawrence Scientific School, together with a paper on the methods of testing road materials in France.

The work at the laboratory has proceeded along the same general lines as in previous years, though with much greater expedition ; this is chiefly due to the employment of an assistant, Mr. W. J. Jordan, who has attained considerable efficiency in the conduct of the regular tests.

Abrasion tests have been made on all specimens received at the laboratory previous to December 15, amounting in all to 89 tests. Microscopical sections and petrographical analyses have been made on all specimens where such work seemed desirable. The microscopical sections made in previous years have been carefully re-examined, to determine the percentage in which the more important minerals occur in each. From these percentage analyses a table is being made, which will give the mineral composition of each rock, and will also contain an estimate of the extent to which decomposition has progressed in each rock.

In the accompanying table will be found the coefficients of wear, together with the specific densities and the microscopic determinations of all specimens received at the laboratory previous to Dec. 15, 1897.

Much time has been devoted to mapping the rock out-crops of the State, especially in Essex County ; more than two hundred square miles have been covered. The observations taken are at present being plotted on the State Topographical Map, and will be presented to the commission early in the coming year.

In the report of last year, and also in a special report, the advisability of completing certain tests on the cementing value of stone was suggested to the commission. Apparatus has been designed for these tests, and partly completed, and it is hoped that the commission will make for the ensuing year an appropriation sufficient to allow their completion.

Table showing Specific Densities, Coefficients of Wear, etc.

	LOCALITY OF STONE.	Date of Test.	Specific Den- sity.	Coefficient of Wear.	Percentage Wear.	Name of Stone.	Number of Test.
	Acushnet, Bristol Co., Mass., .	1897	-	9.32	4.29	Field stone (erratics), .	147
	Amherst, Hampshire Co., Mass., .	1897	3.00	20.33	1.97	Diabase, .	107
	Andover, Essex Co., Mass., .	1897	-	10.29	3.88	Mixed stone, .	150
19, VIII.	(3-L), Ashby, Middlesex Co., Mass., .	1896	2.7	8.41	4.76	Granite, .	68
	Ashby, Middlesex Co., Mass., .	1897	-	5.43	7.36	Field stone (erratics), .	102
19, VIII.	(6-K), Ashby, Middlesex Co., Mass., .	1897	2.6	6.08	6.57	Gneiss, .	114
	Ashby, Middlesex Co., Mass., .	1897	-	7.31	5.47	Field stone (erratics), .	149
16, II.	(30-B), Athol, Worcester Co., Mass., .	1897	2.7	12.52	3.19	Biotite schist, .	115
	Auburn, Worcester Co., Mass., .	1897	2.6	12.50	3.20	Hornblende gneiss, .	170
	Beverly, Essex Co., Mass., .	1897	2.7	21.16	1.90	Granite, .	89
37, VI.	(15-I), Beverly, Essex Co., Mass., .	1897	2.9	16.71	2.89	-	112
37, VI.	(12-0), Beverly, Essex Co., Mass., .	1897	2.7	17.48	2.29	Hornblende granite, .	113
31, VI.	(25-P), Boston, Suffolk Co., Mass., .	1895	2.7	16.06	2.49	Felsite, .	52
	Brewster, Barnstable Co., Mass., .	1897	-	15.77	2.54	Field stone (erratics), .	159
	Bristol, R. I., .	1897	-	10.45	3.82	Field stone (erratics), .	124
	Brookton, Plymouth Co., Mass., .	1897	3.0	18.42	2.17	-	145
31, VI.	(5-B), Brookline, Norfolk Co., Mass., .	1895	2.9	11.40	3.51	Diabase, .	21
31, VI.	(7-B), Brookline, Norfolk Co., Mass., .	1895	3.0	14.71	2.72	Diabase porphyry, .	30
10, II.	(26-B), Buckland, Franklin Co., Mass., .	1895	3.0	7.94	5.04	Hornblende gneiss, .	62
10, II.	(21-C), Buckland, Franklin Co., Mass., .	1895	2.7	11.71	3.42	Schist, .	64
	Chester, Hampden Co., Mass., .	1895	2.8	12.21	3.27	Schist, .	56
	Chester, Hampden Co., Mass., .	1895	3.7	10.62	3.77	Corundum gneiss, .	58
	Clinton, Worcester Co., Mass., .	1897	2.7	8.27	4.83	Gneiss, .	130
	Clinton, Worcester Co., Mass., .	1897	2.9	4.87	8.20	Mica schist, .	131

Table showing Specific Densities, Coefficients of Wear, etc. — Continued.

LOCALITY OF STONE.		Date of Test.	Specific Den- sity.	Coefficient of Wear.	Percentage Wear.	Name of Stone.	Number of Test.
44, III.	Clinton, Worcester Co., Mass.,	1897	2.9	8.17	4.89	Gneiss, .	132
	Concord, Middlesex Co., Mass.,	1897	—	14.15	2.83	Field stone (erratics), .	160
	Cortland, Westchester Co., N. Y.,	1897	3.0	7.46	5.36	Gabbro, .	128
	Cottage City, Mass.,	1897	—	11.22	3.56	Field stone (erratics), .	141
	Cumberland, R. I., .	1895	3.6	9.42	4.24	Peridotite, .	49
	Cumberland, R. I., .	1895	2.6	9.07	4.41	Quartzite, .	54
	Deerfield, Franklin Co., Mass.,	1897	3.0	28.57	1.40	Diabase, .	85
	Dennis, Barnstable Co., Mass.,	1897	—	19.19	2.08	Field stone (erratics), .	103
	Dennis, Barnstable Co., Mass.,	1897	—	15.98	2.50	Field stone (erratics), .	163
	Duanesburgh, N. Y., .	1897	2.6	10.53	3.80	Argillaceous sandstone, .	127
	Duxbury, Plymouth Co., Mass.,	1895	2.7	13.46	2.97	Gneiss, .	4
	East Providence, R. I., .	1897	—	9.21	4.34	Field stone (erratics), .	161
	East Providence, R. I., .	1895	2.7	9.57	4.18	Grit (carboniferous?), .	55
	East Providence, R. I., .	1895	2.7	13.42	2.98	Grit (carboniferous?), .	60
	Everett, Middlesex Co., Mass.,	1895	2.9	13.87	2.88	Diabase, .	14
	Florida, Berkshire Co., Mass.,	1897	—	2.02	19.78	Stratite, .	116
31, VIII.	Florida, Berkshire Co., Mass.,	1897	—	6.70	5.96	Mixed stone, .	117
7, II.	(31-B), Florida, Berkshire Co., Mass.,	1895	2.6	11.03	3.63	Hornblende granite, .	33
7, I.	(28-U), Gloucester, Essex Co., Mass., .	1895	2.8	12.63	3.17	Angite nepheline syenite, .	37
43, II.	(32-F), Gloucester, Essex Co., Mass., .	1897	—	13.34	3.00	—	90
43, II.	Gloucester, Essex Co., Mass., .	1895	2.3	8.35	4.79	Chert, .	50
3, IV.	Gordon Co., Georgia, .	1895	2.9	9.52	4.20	Limestone, .	59
3, VII.	Great Barrington, Berkshire Co., Mass.,	1897	2.7	14.62	2.74	Biotite gneiss, .	137
	Great Barrington, Berkshire Co., Mass.,	1897	3.0	30.40	1.31	Diabase, .	125
	Guttenberg, N. J., .	1895	2.9	14.91	2.68	Diabase, .	61
	Haverstraw, N. Y., .	1897	—	15.60	2.56	Mixed stone, .	104
	Hingham, Plymouth Co., Mass.,	1897	—	15.60	2.56	Mixed stone, .	104

37,	IV.	Holden, Mass.,	1895	-	6.58	6.08	Field stone (erratics),	18
37,	IV.	Holyoke, Mass.,	1896	2.9	19.67	2.02	Diabase,	75
		Howes Cove, N. Y.,	1897	2.7	9.64	4.15	Limestone,	121
		(22-N), Ipswich, Essex Co., Mass.,	1895	2.9	24.05	1.66	Diabase,	69
		(20-K), Ipswich, Essex Co., Mass.,	1897	2.8	18.39	2.17	Hornblende granite,	111
		Johnstone, R. I.,	1897	2.7	21.41	1.87	-	120
		Lawrence, Essex Co., Mass.,	1896	2.8	17.20	2.33	Limestone (siliceous),	74
2,	IX.	Lawrence, Essex Co., Mass.,	1897	2.8	19.00	2.10	Slaty sandstone,	164
5,	III.	Lee, Berkshire Co., Mass.,	1894	2.7	2.85	14.01	Marble,	1
		(15-Z), Lee, Berkshire Co., Mass.,	1895	2.6	11.65	3.43	Quartzite,	9
		(11-E), Lee, Berkshire Co., Mass.,	1895	2.8	12.15	3.29	Schist,	53
5,	III.	Lee, Berkshire Co., Mass.,	1895	2.8	11.43	3.50	Biotite schist,	63
5,	III.	(16-K), Lee, Berkshire Co., Mass.,	1895	2.9	11.69	3.42	Quartzite,	136
5,	III.	(11-E), Lee, Berkshire Co., Mass.,	1897	2.7	11.69	3.42	Quartzite,	136
2,	VIII.	(24-R), Lenox, Berkshire Co., Mass.,	1894	2.8	8.04	4.98	Epidote, gneiss,	2
		Lincoln, Mass.,	1897	-	12.86	3.11	Field stone (erratics),	92
		Lockport, Niagara Co., N. Y.,	1897	2.5	17.48	2.29	Medina sandstone,	126
38,	I.	Lynn, Essex Co., Mass.,	1895	3.0	19.77	2.02	Diabase,	27
38,	I.	(16-D), Lynn, Essex Co., Mass.,	1895	3.0	20.37	1.96	Diabase,	28
38,	I.	(12-K), Lynn, Essex Co., Mass.,	1895	2.7	14.66	2.73	Felsite,	31
38,	I.	(12-N), Lynn, Essex Co., Mass.,	1895	2.7	12.30	3.25	Felsite,	34
38,	I.	(10-C), Lynn, Essex Co., Mass.,	1895	3.0	18.17	2.20	Diabase,	36
31,	VII.	(5-E), Maplewood, Mass.,	1897	2.7	14.09	2.84	Hornblende granite,	165
		Marion, Plymouth Co., Mass.,	1897	-	9.95	4.02	Mixed stone,	108
		Marion, Plymouth Co., Mass.,	1897	-	8.44	4.73	Field stone (erratics),	144
		Marshfield, Plymouth Co., Mass.,	1897	-	7.90	5.05	Field stone (erratics),	99
		Matapoisett, Mass.,	1895	-	8.78	4.55	Field stone (chiefly granite),	13
31,	IV.	(31-N), Medford, Middlesex Co., Mass.,	1895	3.0	15.82	2.53	Diabase,	26
		Meriden, Conn.,	1895	2.8	12.50	3.20	Diabase,	17
		Meriden, Conn.,	1897	2.8	15.49	2.58	Diabase,	81
		Methuen, Mass.,	1897	2.7	14.00	2.86	Sandstone (siliceous),	100
		Methuen, Mass.,	1897	2.7	18.68	2.14	Sandstone (siliceous),	167
		Middleborough, Mass.,	1897	-	7.99	5.00	Field stone (erratics),	82

Table showing Specific Densities, Coefficients of Wear, etc. — Continued.

LOCALITY OF STONE.		Date of Test.	Specific Den- sity.	Coefficient of Wear.	Percentage Wear.	Name of Stone.	Number of Test.
	Middleborough, Mass.,	1897	—	11.14	3.59	Field stone (erratics),	158
	Millville, Mass.,	1897	3.0	14.75	2.71	—	168
	(1-H), Milton, Norfolk Co., Mass.,	1897	3.0	25.73	1.55	Diabase,	133
32, VII.	(5-E), Milton, Norfolk Co., Mass.,	1897	2.8	20.97	1.91	—	156
31, VII.	(5-E), Milton, Norfolk Co., Mass.,	1897	3.0	22.77	1.75	Diabase,	157
31, VII.	Monson, Hampden Co., Mass.,	1896	3.0	22.13	1.80	Diabase,	78
	Montserat Crushing Plant,	1896	2.8	14.58	2.75	Granite,	71
	Nantucket, Mass.,	1895	—	9.47	4.22	Field stone (erratics),	23
36, VI.	(32-G), Newbury, Essex Co., Mass.,	1895	3.0	20.40	1.96	Diabase porphyry,	39
36, VI.	(29-I), Newbury, Essex Co., Mass.,	1895	2.9	14.45	2.77	Hornblende granite,	45
36, VI.	(3-H), Newburyport, Essex Co., Mass.,	1895	2.7	16.10	2.48	Diabase,	47
	Newburyport, Essex Co., Mass.,	1897	—	16.52	2.42	Mixed stone,	166
	Newport, R. I.,	1897	2.7	20.34	1.97	Quartzite,	118
31, II.	(32-L), Newton, Middlesex Co., Mass.,	1895	2.8	20.79	1.92	Trachyte,	19
31, III.	(1-V), Newton, Middlesex Co., Mass.,	1895	—	8.67	4.61	Conglomerate,	20
	Norfolk, Mass.,	1897	—	13.20	3.03	Field stone (erratics),	146
	North Attleborough, Mass.,	1895	2.7	9.09	4.40	Field stone (erratics),	11
	Northampton, Mass.,	1895	—	10.69	3.74	Gneiss,	10
	North Dartmouth State Road,	1897	—	14.76	2.72	Granite,	87
	North Westport, Mass.,	1897	2.6	14.20	2.82	Hornblende granite,	188
	North Weymouth Sand & Gravel Co.,	1897	2.8	14.52	2.75	Felsite,	106
	Norwood, Mass.,	1897	—	13.20	3.03	Field stone (erratics),	95
13, IX.	(1-R), Orange, Franklin Co., Mass.,	1895	2.7	9.78	4.08	Hornblende granite,	51
	Paxton, Franklin Co., Mass.,	1897	2.7	10.26	3.90	Hornblende gneiss,	152
	Paxton, Worcester Co., Mass.,	1895	2.8	5.01	7.98	Granitoid gneiss,	48
2, VII.	(28-D), Pittsfield, Berkshire Co., Mass.,	1895	2.8	9.38	4.26	Limestone,	3

	Pittsfield, Berkshire Co., Mass.,	1896	2.8	9.77	4.09	Biotite schist.	79
	Plymouth, Plymouth Co., Mass.,	1895	-	10.10	3.96	Field stone (erratics),	42
	Providence, R. I.,	1895	2.7	10.02	3.99	Grit (carboniferous?),	46
VII.	(3-P), Quincy, Norfolk Co., Mass.,	1895	2.7	10.16	3.94	Granite,	22
III.	(30-K), Quincy, Norfolk Co., Mass.,	1895	3.0	15.21	2.63	Diabase porphyry,	24
	Quincy, Norfolk Co., Mass.,	1897	2.8	19.91	2.01	Felsite,	86
VII.	(26-F), Revere, Suffolk Co., Mass.,	1895	2.7	13.21	3.03	Felsite porphyry,	15
	Revere, Suffolk Co., Mass.,	1897	2.6	15.21	2.63	Felsite,	140
	Rockland Lake, Rockland Co., N. Y.,	1897	2.9	17.79	2.25	Diabase (coarse),	134
V.	(34-K), Rockport, Essex Co., Mass.,	1895	2.6	12.57	3.18	Granite,	44
43,	Rockport, Knox Co., Me.,	1896	2.9	8.26	4.85	Limestone,	65
	Rockport, Knox Co., Me.,	1896	2.7	9.00	4.45	Limestone,	66
	Rockport, Knox Co., Me.,	1896	2.7	14.60	2.74	Quartzite,	67
	Rockport, Knox Co., Me.,	1897	-	9.58	4.17	-	139
	Round Island, N. Y.,	1897	2.8	23.02	1.73	Gneiss,	122
IV.	(5-D), Rowley, Essex Co., Mass.,	1897	2.6	12.32	3.25	Felsite (brecciated),	135
VI.	(31-F), Salem, Essex Co., Mass.,	1895	2.9	15.55	2.57	Augite diorite,	6
VI.	(31-F), Salem, Essex Co., Mass.,	1897	3.0	14.34	2.79	Diabase,	110
VI.	(7-P), Salisbury, Essex Co., Mass.,	1895	2.8	16.76	2.39	Camptonite,	43
	Sandwich, Mass.,	1897	-	11.52	3.47	Field stone (erratics),	169
VII.	(24-W), Saugus, Essex Co., Mass.,	1895	3.0	16.02	2.50	Diabase,	32
VI.	(21-Y), Saugus, Essex Co., Mass.,	1895	3.0	16.08	2.49	Diabase,	29
VII.	(20-V), Saugus, Essex Co., Mass.,	1895	3.0	18.25	2.19	Diabase,	35
VII.	(12-W), Saugus, Essex Co., Mass.,	1895	2.7	8.99	4.45	Granite,	38
VII.	(16-V), Saugus, Essex Co., Mass.,	1895	3.0	21.22	1.89	Diabase,	40
	Shrewsbury, Mass.,	1897	-	13.48	2.97	Mixed stone,	83
	Shrewsbury, Essex Co., Mass.,	1897	-	12.32	3.25	Field stone (erratics),	151
	Somerset, Mass.,	1897	-	11.88	3.37	Field stone (erratics),	93
	Somerset, Mass.,	1897	-	11.53	3.47	Field stone (erratics),	155
V.	(7-M), Somerville, Middlesex Co., Mass.,	1895	2.8	8.48	4.72	Slate (Cambrian?),	8
V.	(14-T), Somerville, Middlesex Co., Mass.,	1895	2.9	9.28	4.31	Diabase,	25
I.	(23-C), Sterling, Mass.,	1897	2.9	19.77	2.07	Hornblende syenite,	162
	Tisbury, Dukes Co., Mass.,	1895	-	8.88	4.51	Field stone (erratics),	41

Table showing Specific Densities, Coefficients of Wear, etc. — Concluded.

LOCALITY OF STONE.		Date of Test.	Specific Density.	Coefficient of Wear.	Percentage Wear.	Name of Stone.	Number of Tests.
26, VIII.	Tomkin's Cove, N. Y.,	1895	2.8	6.31	6.34	Limestone (siliceous),	7
	Tomkin's Cove, N. Y.,	1895	2.8	7.84	5.10	Limestone (siliceous),	57
	Uxbridge, Worcester Co., Mass.,	1896	2.7	12.62	3.17	Hornblende granite,	72
	Walpole, Norfolk Co., Mass.,	1897	—	11.57	3.46	Conglomerate,	80
	Waltham, Middlesex Co., Mass.,	1895	2.6	12.16	3.29	Granite,	5
	Ware, Worcester Co., Mass.,	1896	3.0	23.31	1.72	Diabase,	73
	Warren, Rhode Island,	1897	—	11.88	3.37	Field stone (erratics),	123
	Warwick, Rhode Island,	1897	—	10.71	3.72	Field stone (erratics),	119
	Watertown, Middlesex Co., Mass.,	1897	—	12.15	3.29	Mixed stone,	84
	Watertown, Middlesex Co., Mass.,	1897	—	16.74	2.39	Field stone (erratics),	96
	Watertown, Middlesex Co., Mass.,	1897	2.8	13.70	2.92	Diabase,	129
	Webster, Mass.,	1897	2.9	22.23	1.80	—	148
31, II.	West Auburn, Mass.,	1897	2.7	12.01	3.33	Limestone,	109
	Westminster, Mass.,	1897	—	8.34	4.80	Field stone (erratics),	142
	West Newbury, Mass.,	1897	—	10.11	3.95	Field stone (erratics),	101
	Westport, Mass.,	1897	—	14.18	2.82	Mixed stone,	154
	West Springfield, Mass.,	1895	3.0	15.60	2.56	Diabase,	16
	West Springfield, Mass.,	1896	3.0	22.14	1.81	Diabase porphyry,	77
	West Springfield, Mass.,	1897	2.9	24.99	1.60	Diabase,	88
	West Springfield, Mass.,	1897	3.0	21.60	1.85	Diabase,	98
	West Tisbury, Dukes Co., Mass.,	1897	—	8.40	4.76	Field stone (erratics),	94
	West Tisbury, Dukes Co., Mass.,	1897	—	6.76	5.91	Field stone (erratics),	143
	Whitman State Road,	1895	—	5.93	6.75	Field stone (erratics),	12
	Worcester, Worcester Co., Mass.,	1897	—	11.83	3.38	Field stone (erratics),	105
12, II.	Worcester, Worcester Co., Mass.,	1897	—	10.46	3.82	Field stone (erratics),	153
	Yarmouth, Barnstable Co., Mass.,	1897	—	11.99	3.34	Field stone (erratics),	91

To give a comprehensive account of all the methods and apparatus used for testing road materials would be well-nigh impossible in a paper of this nature. Except in France, most of the methods employed for such tests have been devised by individuals or committees seeking to find the relative values of a few specimens. Although in some cases of this nature the methods employed have shown considerable ingenuity, they have always been conducted on a limited scale, and the results obtained have always been insufficient to warrant any general conclusions.

In France the highways are built and maintained by the government; and, under the able administration of the National School of Roads and Bridges, the highways of France have surpassed in excellence those of any other country.

The school referred to has adopted a regular system for testing all materials used on the national highways. These tests have reached a very high degree of efficiency, and France to-day is the only country where a scientific selection is made of road materials. It has, therefore, seemed best to the writer to limit this paper to an account of the tests used by the National School of Roads and Bridges of France.

The most important materials to be considered are: (*a*), broken stone used for macadamizing; (*b*), materials used for paving, such as blocks of stone and wood; (*c*), the asphalts.

With broken stone such as that used for macadamizing, the tests most commonly employed by the French school consist in the determination of the resistance both to abrasion and compression.

The test for the resistance to abrasion is made with a special apparatus, known as the Deval machine. This machine was first exhibited at the Exposition of Paris in 1878, in the pavilion of the city of Paris, and attracted considerable attention among highway engineers at the time.

As exhibited, then, the Deval machine consisted of two iron cylinders, each 20 cm. in diameter and 34 cm. in depth. These cylinders are closed at one end, and have a cover fitting air tight on the other end. They are attached to a horizontal shaft, to which they are inclined at an angle of 30°, and about which they are rotated, the centres of the cylinders being on the horizontal shaft.

The Deval machine used by the French school to-day is practically the same as that of 1878. Previous to that date it had been used by the engineers of the city of Paris, and its usefulness established. The only modification which the National School has made is in reference to the number of cylinders. In order to increase the output of the machine the number of cylinders has been increased to eight, which are mounted four by four on two parallel shafts, geared to ro-

tate with the same rapidity. This arrangement renders it possible to make eight tests simultaneously.

The stones employed are of the size used on roadways, and have been previously cleansed by washing. In making a test, 5 kilogrammes of the stone are placed in one of the cylinders, the air-tight cover is then screwed on, and the cylinder rotated at the rate of 2,000 revolutions per hour by a small gas engine. A revolution counter attached to the shaft is frequently consulted, and permits the control of the regularity of action of the machine.

The rotation of the cylinder throws the fragments of stone from one end of the cylinder to the other, twice in each revolution, and causes them to grind against one another and against the walls of the cylinder.

At the end of five hours, or 10,000 revolutions, the machine is stopped, the cylinder opened and the contents emptied into a basin. The cylinder and the cover are carefully washed, and the water used is poured into the basin. Each stone is then washed and brushed under the water, and is thus cleansed from the adhering dust, which remains in the water as a sediment. After drying, the detritus is emptied into the upper of two superimposed sieves, the interstices of which measure respectively 1 cm. and .16 cm. in diameter. They are thus separated into three sizes. Only the material that has passed through both of the sieves is used for the purpose of the test, its weight being carefully recorded.

For many years a standard stone of superior wearing quality was always placed in one of the cylinders as a unit of comparison, and the proportion of the weights of the dust (under .16 cm.) of the standard stone and the stone to be tested was assumed to give the relative resistance to abrasion of the two stones, — the value sought for. It was found, however, that only the best varieties of stone gave less than 100 grammes of dust; *i. e.*, 20 grammes of dust per kilogramme of stone, or 2 per cent. of their weight. The number 20 was consequently adopted as a standard of excellence. The “coefficient of wear” for any stone is then given by the formula,

$$\text{Coefficient of wear} = 20 \times \frac{20}{w} = \frac{400}{w},$$

where w is the weight in grammes of the dust obtained per kilogramme of stone.

Great care is taken to make the tests on all specimens under precisely similar conditions, so that all results are comparable.

The Deval test has been very widely used, and is as satisfactory as any other single test so far devised for obtaining the quality of road-making stone. The apparatus has undergone various modifica-

tions by different experimenters, such as mounting the cylinder at right angles to the shaft and placing metal balls or weights inside of the cylinder, to hasten the wear of the stone. None of these alterations, however, have been used sufficiently to demonstrate the advisability of their adoption.

About 200 tests have been made with this machine by the Massachusetts Highway Commission* on road-making stones of Massachusetts. For a resumé of the results of these tests, the reader is referred to the table accompanying this report, which contains 170 "coefficients of wear," together with other data.

The usual test employed for determining the resistance to compression of macadamizing stone, is as follows:—

Cubes of stone are sawed at the laboratory, from specimens carefully selected to represent the average quality of the stone; they are the largest possible, having regard to the presumed resistance of the specimen and the power of the testing machine. The cubes are placed between two parallel iron plates, and the pressure is obtained by a system of levers or by a hydraulic press, and the pressure is measured by the machine. This test is made upon at least three cubes of each sample, after dessication either in the open air or at a temperature of 40° C, or after being saturated with water. The resistance offered by each cube is obtained in kilogrammes per square centimetre of bearing surface, and the average of the results furnished by the different cubes is used.

The cubes used for the crushing test are carefully weighed and measured, for determining the density of the stone.

The tests most commonly used for determining the values of paving materials of all sorts are the determination of resistance to wear by rubbing, the resistance to compression, and the resistance to impact.

The determination of wear by rubbing is made with the Dorrey machine. The specimens to be tested are sawed into rectangular prisms, having 4 cm. by 6 cm. base and 8 cm. height. These specimens are placed two at a time, so that they rest on the upper surface of a circular grinding disc, which rotates in a horizontal plane. They are held in clamps, so arranged that the bases of the specimens rest on opposite sides of the grinding disc, 26 cm. from the centre. The specimens are weighted so that they press against the grinding disc with a pressure of 250 grammes per square centimetre. Sand and water are fed onto the disc from funnels above. The sand used is of a standard quality and size. It is made by crushing pure quartzite rock, and is carefully screened to a standard size. The quantity of

* A full account of the methods and apparatus employed in these tests will be found in annual report of the Massachusetts Highway Commission for 1896; also XVI, Annual Report United States Geological Survey.

sand used in each test is one litre per specimen for each thousand turns of the grinding disc. The disc is rotated at the rate of 1,000 revolutions per half hour, and a test is completed in 4,000 revolutions.

The diminution in the height of the specimen is measured and its loss in weight determined after each thousand turns of the disc. After 2,000 revolutions the specimens are reversed, in order to ascertain if there is any difference in wear between the two ends, and to make the result approach nearer a general average of the sample. No "coefficient of wear" has been established for this test; it is the loss in height undergone by each specimen after 4,000 revolutions of the grinding disc which is set down as the result of the test, and which serves for comparison. Tests are always made on at least three specimens of each sample, and the final result computed from their average.

The compression test employed for paving stones is made in the same manner as that previously described for macadamizing stone; but, to lessen the expense, the stubs left from the hardness test with the Dorrey apparatus are redressed into cubes for this test.

The impact test is made with a special apparatus designed for the purpose at the National Laboratory. It resembles very closely in principle a pile-driver, having a hammer with vertical guides to direct its fall. This hammer is raised by a cord, and is released automatically at any desired height, from which it falls upon the specimen which is held in clamps below.

The test is made upon 4 cm. cubes. Two hammers are employed, one weighing 4.2 kilogrammes and the other 20 kilogrammes; they have, respectively, falls of 100 cm. and 80 cm. The number of blows necessary to crack the specimen, and also the number necessary to produce its complete destruction, are determined. This test is made upon at least three cubes of each specimen, with each hammer. A special device prevents the smaller hammer from rebounding after the blow.

Several other tests are used; *e. g.*, the determination of resistance to breakage by bending; the determination of porosity, and resistance to frost; such tests, however, are not considered necessary for paving stones, and consequently are seldom made.

For wooden blocks the tests commonly consist in the determination of their resistance to wear when saturated with water; resistance to compression; resistance to impact; and the determination of dilation by absorption of water, and the measurement of the thrust exerted when this dilation is partially prevented. The specimens for these tests are selected in a similar manner to those for all other tests, — to represent the average quality of the sample.

The test for wear is made with the Dorrey machine, which has been described above, the specimens being prisms of the same dimensions as those used for testing the hardness of paving stones. The specimens are placed in the machine with the grain of the wood at right angles to the grinding disc. The only difference in the conduct of the test is that emery No. 3 is used as the material for grinding, instead of quartz sand. Only the loss in height of the specimen is recorded.

The compression test is made with a hydraulic press upon prismatic specimens, with the base 8 cm. square, and a height equal to that of a paving block, the grain of the wood being parallel to the direction of the load. The test specimens are either dried at a temperature between 30° and 40° C, or they are saturated with an amount of water equal to that absorbed by a paving block in actual use; this amount having been determined experimentally.

The resistance to impact is made upon prisms having a base 6 cm. square and a height equal to that of a paving block, placed in a cast-iron box 7 cm. square, open both at top and bottom. The prism is held in the box by a resinous cement which completely surrounds it, the top of the prism projecting about 1 cm. above the box. A 20-kilogramme hammer is employed in this test, with a height of fall of 200 cm.

The number of blows of the hammer, which cause an appreciable weakening, as indicated by a smaller rebound of the hammer, and a diminution in the height of the specimen is made note of. Three dried and three wet specimens are subjected to this test.

For determining the strength of thrust caused by absorption when dilation is partly prevented, whole paving blocks are used.

The special device used for this test is as follows. The paving block, after thorough dessication, is placed in a water-tight receptacle and held between two plates at top and bottom, so that the top face of the paving block rests against a block of cast iron which is stationary. The lower plate is supported on the small lever arm of a cement-testing machine. Water at a temperature of 30° C is poured around the paving block, and as dilation takes place the lever arm of the machine tends to rise. When it rises it opens a valve through which mercury pours into a vessel supported at the end of the arm till the arm comes back to mid-position, when the valve is closed. As the position of the lower plate is fixed when the long-lever arm is in its mid-position, and, as this arm is always kept automatically in that position, the specimen is entirely prevented from longitudinal extension. The weight of the mercury in the vessel at the end of the lever arm is at any moment a measure of the force exerted by the test piece; and, as the vessel is supported by a spring balance, the force

exerted by the paving block can be read at any time. Observations are made at first at intervals of three hours ; then, as absorption goes on and the consequent increase of thrust becomes less rapid, at intervals of twelve hours and finally at intervals of twenty-four hours till all increase ceases. It will be seen that this test does not reproduce closely the condition existing on actual roads, as in that case the block is only free to expand in one direction, viz., upwards ; whereas during the test the specimen is free to expand in all directions except longitudinally. Nevertheless, the results are of value in giving some indication of the amount of thrust to be expected on actual roads.

After the test the specimens are weighed, to ascertain how much water has been absorbed.

No mechanical tests have yet been devised, or considered necessary for the asphalts. Chemical analyses are made, however, to determine the proportion of bitumen, sand, calcium carbonate, clay, pyrite, etc.

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Geologist.

APPENDIX C.

The following table shows the work done in 1897, and its cost. The column headed "Total value of work done" includes the amounts already paid and the amounts held in reserve, the miscellaneous items of cost pertaining to the work, and the cost of inspection and engineering.

Cost of stone bands, rail, haul, cement, freight on same and advertising

^c stands on which work is yet to be done

* Includes stain on shoulder

APPENDIX C.—Table showing Work done in 1897, and its Cost—Continued.

No.	Name of Work.	1897.		1896.		1895.		1894.		1893.		1892.		1891.		1890.		1889.		1888.		1887.		1886.		1885.		1884.		1883.		1882.		1881.		1880.		1879.		1878.		1877.		1876.		1875.		1874.		1873.		1872.		1871.		1870.		1869.		1868.		1867.		1866.		1865.		1864.		1863.		1862.		1861.		1860.		1859.		1858.		1857.		1856.		1855.		1854.		1853.		1852.		1851.		1850.		1849.		1848.		1847.		1846.		1845.		1844.		1843.		1842.		1841.		1840.		1839.		1838.		1837.		1836.		1835.		1834.		1833.		1832.		1831.		1830.		1829.		1828.		1827.		1826.		1825.		1824.		1823.		1822.		1821.		1820.		1819.		1818.		1817.		1816.		1815.		1814.		1813.		1812.		1811.		1810.		1809.		1808.		1807.		1806.		1805.		1804.		1803.		1802.		1801.		1800.		1799.		1798.		1797.		1796.		1795.		1794.		1793.		1792.		1791.		1790.		1789.		1788.		1787.		1786.		1785.		1784.		1783.		1782.		1781.		1780.		1779.		1778.		1777.		1776.		1775.		1774.		1773.		1772.		1771.		1770.		1769.		1768.		1767.		1766.		1765.		1764.		1763.		1762.		1761.		1760.		1759.		1758.		1757.		1756.		1755.		1754.		1753.		1752.		1751.		1750.		1749.		1748.		1747.		1746.		1745.		1744.		1743.		1742.		1741.		1740.		1739.		1738.		1737.		1736.		1735.		1734.		1733.		1732.		1731.		1730.		1729.		1728.		1727.		1726.		1725.		1724.		1723.		1722.		1721.		1720.		1719.		1718.		1717.		1716.		1715.		1714.		1713.		1712.		1711.		1710.		1709.		1708.		1707.		1706.		1705.		1704.		1703.		1702.		1701.		1700.		1699.		1698.		1697.		1696.		1695.		1694.		1693.		1692.		1691.		1690.		1689.		1688.		1687.		1686.		1685.		1684.		1683.		1682.		1681.		1680.		1679.		1678.		1677.		1676.		1675.		1674.		1673.		1672.		1671.		1670.		1669.		1668.		1667.		1666.		1665.		1664.		1663.		1662.		1661.		1660.		1659.		1658.		1657.		1656.		1655.		1654.		1653.		1652.		1651.		1650.		1649.		1648.		1647.		1646.		1645.		1644.		1643.		1642.		1641.		1640.		1639.		1638.		1637.		1636.		1635.		1634.		1633.		1632.		1631.		1630.		1629.		1628.		1627.		1626.		1625.		1624.		1623.		1622.		1621.		1620.		1619.		1618.		1617.		1616.		1615.		1614.		1613.		1612.		1611.		1610.		1609.		1608.		1607.		1606.		1605.		1604.		1603.		1602.		1601.		1600.		1599.		1598.		1597.		1596.		1595.		1594.		1593.		1592.		1591.		1590.		1589.		1588.		1587.		1586.		1585.		1584.		1583.		1582.		1581.		1580.		1579.		1578.		1577.		1576.		1575.		1574.		1573.		1572.		1571.		1570.		1569.		1568.		1567.		1566.		1565.		1564.		1563.		1562.		1561.		1560.		1559.		1558.		1557.		1556.		1555.		1554.		1553.		1552.		1551.		1550.		1549.		1548.		1547.		1546.		1545.		1544.		1543.		1542.		1541.		1540.		1539.		1538.		1537.		1536.		1535.		1534.		1533.		1532.		1531.		1530.		1529.		1528.		1527.		1526.		1525.		1524.		1523.		1522.		1521.		1520.		1519.		1518.		1517.		1516.		1515.		1514.		1513.		1512.		1511.		1510.		1509.		1508.		1507.		1506.		1505.		1504.		1503.		1502.		1501.		1500.		1499.		1498.		1497.		1496.		1495.		1494.		1493.		1492.		1491.		1490.		1489.		1488.		1487.		1486.		1485.		1484.		1483.		1482.		1481.		1480.		1479.		1478.		1477.		1476.		1475.		1474.		1473.		1472.		1471.		1470.		1469.		1468.		1467.		1466.		1465.		1464.		1463.		1462.		1461.		1460.		1459.		1458.		1457.		1456.		1455.		1454.		1453.		1452.		1451.		1450.		1449.		1448.		1447.		1446.		1445.		1444.		1443.		1442.		1441.		1440.		1439.		1438.		1437.		1436.		1435.		1434.		1433.		1432.		1431.		1430.		1429.		1428.		1427.		1426.		1425.		1424.		1423.		1422.		1421.		1420.		1419.		1418.		1417.		1416.		1415.		1414.		1413.		1412.		1411.		1410.		1409.		1408.		1407.		1406.		1405.		1404.		1403.		1402.		1401.		1400.		1399.		1398.		1397.		1396.		1395.		1394.		1393.		1392.		1391.		1390.		1389.		1388.		1387.		1386.		1385.		1384.		1383.		1382.		1381.		1380.		1379.		1378.		1377.		1376.		1375.		1374.		1373.		1372.		1371.		1370.		1369.		1368.		1367.		1366.		1365.		1364.		1363.		1362.		1361.		1360.		1359.		1358.		1357.		1356.		1355.		1354.		1353.		1352.		1351.		1350.		1349.		1348.		1347.		1346.		1345.		1344.		1343.		1342.		1341.		1340.		1339.		1338.		1337.		1336.		1335.		1334.		1333.		1332.		1331.		1330.		1329.		1328.		1327.		1326.		1325.		1324.		1323.		1322.		1321.		1320.		1319.		1318.		1317.		1316.		1315.		1314.		1313.		1312.		1311.		1310.		1309.		1308.		1307.		1306.		1305.		1304.		1303.		1302.		1301.		1300.		1299.		1298.		1297.		1296.		1295.		1294.		1293.		1292.		1291.		1290.		1289.		1288.		1287.		1286.		1285.		1284.		1283.		1282.		1281.		1280.		1279.		1278.		1277.		1276.		1275.		1274.		1273.		1272.		1271.		1270.		1269.		1268.		1267.		1266.		1265.		1264.		1263.		1262.		1261.		1260.		1259.		1258.		1257.		1256.		1255.		1254.		1253.		1252.		1251.		1250.		1249.		1248.		1247.		1246.		1245.		1244.		1243.		1242.		1241.		1240.		1239.		1238.		1237.		1236.		1235.		1234.		1233.		1232.		1231.		1230.		1229.		1228.		1227.		1226.		1225.		1224.		1223.		1222.		1221.		1220.		1219.		1218.		1217.		1216.		1215.		1214.		1213.		1212.		1211.		1210.		1209.		1208.		1207.		1206.		1205.		1204.		1203.		1202.		1201.		1200.		1199.		1198.		1197.		1196.		1195.		1194.		1193.		1192.		1191.		1190.		1189.		1188.		1187.		1186.		1185.		1184.		1183.		1182.		1181.		1180.		1179.		1178.		1177.		1176.		1175.		1174.		1173.		1172.		1171.		1170.		1169.		1168.		1167.		1166.		1165.		1164.		1163.		1162.		1161.		1160.		1159.		1158.		1157.		1156.		1155.		1154.		1153.		1152.		1151.		1150.		1149.		1148.		1147.		1146.		1145.		1144.		1143.		1142.		1141.		1140.		1139.		1138.		1137.		1136.		1135.		1134.		1133.		1132.		1131.		1130.		1129.		1128.		1127.		1126.		1125.		1124.		1123.		1122.		1121.		1120.		1119.		1118.		1117.		1116.		1115.		1114.		1113.		1112.		1111.		1110.		1109.		1108.		1107.		1106.		1105.		1104.		1103.		1102.		1101.		1100.		1099.		1098.		1097.		1096.		1095.		1094.		1093.		1092.		1091.		1090.		1089.		1088.		1087.		1086.		1085.		1084.		1083.		1082.		1081.		1080.		1079.		1078.		1077.		1076.		1075.		1074.		1073.		1072.		1071.		1070.		1069.		1068.		1067.		1066.		1065.		1064.		1063.		1062.		1061.		1060.		1059.		1058.		1057.		1056.		1055.		1054.		1053.		1052.		1051.		1050.		1049.		1048.		1047.		1046.		1045.		1044.		1043.		1042.		1041.		1040.		1039.		1038.		1037.		1036.		1035.		1034.		1033.		1032.		1031.		1030.		1029.		1028.		1027.		1026.		1025.		1024.		1023.		1022.		1021.		1020.		1019.		1018.		1017.		1016.		1015.		1014.		1013.		1012.		1011.		1010.		1009.		1008.		1007.		1006.		1005.		1004.		1003.		1002.		1001.		1000.		999.		998.		997.		996.		995.		994.		993.		992.		991.		990.		989.		988.		987.		986.		985.		984.		983.		982.		981.		980.		979.		978.		977.		976.		975.		974.		973.		972.		971.		970.		969.		968.		967.		966.		965.		964.		963.		962.		961.		960.		959.		958.		957.		956.		955.		954.		953.		952.		951.		950.		949.		948.		947.		946.		945.		944.		943.		942.		941.		940.		939.		938.		937.		936.		935.		934.		933.		932.		931.		930.		929.		928.		927.		926.		925.		924.		923.		922.		921.		920.		919.		918.		917.		916.		915.		914.		913.		912.		911.		910.		909.		908.		907.		906.		905.		904.		903.		902.		901.		900.		899.		898.		897.		896.		895.		894.		893.		892.		891.		890.		889.		888.		887.		886.		885.		884.		883.		882.		881.		880.		879.		878.		877.		876.		875.		874.		873.		872.		871.		870.		869.		868.		867.		866.		865.		864.		863.		862.		861.		860.		859.		858.		857.		856.	
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APPENDIX C.—Table showing Work done in 1897, and its Cost—Concluded.

TOWN.	Lay-out.	Trans-act.	Date of Last Payment.	Date of Work done.	EXCAVATION AND BUILDING.		LEDGE EXCAVATION.		DRY MURDER MASONRY.		CEMENT RUBBER MASONRY.		GRAVEL.		TALFORD.		SHAPING FOR BROKEN STONE.		BROKEN STONE.		GUARD RAIL.		SIDE DRAINS.		COBBLE CUTTING.		PIPE CULVERTS.		Miscellaneous Amount.	Minor Items of Construction, Amount.	Engineering and Inspection, Amount.	Wages, Amount.								
					Cubic Yards.	Amount.	Cubic Yards.	Amount.	Cubic Yards.	Amount.	Cubic Yards.	Amount.	Cubic Yards.	Amount.	Square Yards.	Amount.	Square Yards.	Amount.	Square Yards.	Amount.	Square Yards.	Amount.	Linear Feet.	Amount.	Linear Feet.	Amount.	Square Yards.	Amount.					Linear Feet.	Amount.						
Brought forward,					\$30,157 57	225,039.7	\$66,979.39	5,191.94	\$8,967.98	3,361.97	\$11,569.09	2,132.33	\$13,219.36	22,831.65	\$13,083.67	1,786.6	\$371.81	421,692	\$8,621.45	290,338	105,126.11	\$161,130.02	41,940.50	\$7,102.15	31,135.9	\$10,714.67	6,585.61	\$1,813.51	6,738.40	\$4,463.58	\$5,533.97	\$6,227.71	\$54,797.17	\$2,490.00						
Warren,	1897	200	November, 1897	6,351.53	1,002.0	253.80	32.10	64.60	61.20	183.90	66.27	225.10	1,350.00	510.00	-	-	8,024	401.21	5,737	1,916.11	3,363.72	196.00	21.56	854.0	298.00	35.68	12.40	238.20	92.00	57.11	57.23	811.81	-	1						
Wayland,	1897	231	December, 1897	5,655	1,270.8	381.09	8.90	14.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.00	13.75	133.86	-	2							
Wenham,	1897	212	December, 1897	6,212.93	2,162.9	779.17	-	-	31.00	85.00	37.00	217.71	-	-	-	-	7,867	167.34	5,323	2,029.00	3,803.20	424.00	84.80	-	-	-	-	-	92.36	71.40	817.09	-	3							
West Boylston,	1897	251	-	4.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63.39	5.99	-	1								
Westborough (Northborough),	1897	250	December, 1897	8,734.90	5,069.0	2,027.52	72.60	127.16	-	-	-	-	-	-	-	-	7,233	141.06	4,890	1,429.16	2,000.82	-	-	1,228.0	429.80	-	-	204.00	122.40	27.30	22.40	864.30	54.00	2						
Westfield,	1897	250	January, 1897	117.06	30.25	-	-	-	-	-	-	-	-	-	-	-	20.00	75.00	-	-	-	-	-	-	-	-	-	-	-	11.81	-	-	6							
Westfield,	1896	250	January, 1897	1,985.16	527.0	181.43	-	-	-	-	-	-	-	-	-	-	-	1,581	91.08	-	546.22	655.65	871.00	130.65	-	-	-	-	42.00	8.75	261.47	149.83	-	7						
Westminster,	1896	250	February, 1897	131.37	91.0	42.92	-	-	-	-	-	-	-	-	-	-	-	600	12.00	-	217.36	326.02	-	-	-	-	-	-	32.00	19.20	41.23	-	8							
Westminster,	1896	185	July, 1897	125.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91.17	-	-	9						
Westminster,	1897	185	December, 1897	8,277.51	4,233.0	1,439.27	2.99	5.24	101.30	303.90	6.11	30.70	-	-	-	-	7,102	142.04	5,071	1,727.00	2,318.72	2,328.00	367.83	-	-	-	-	150.00	90.60	37.83	512.08	858.73	40.25	11						
West Newbury,	1896	185	September, 1897	2,061.47	60.0	15.00	-	-	-	-	-	-	67.00	31.35	60.0	21.00	3,280	65.60	2,243	755.41	1,246.43	-	-	-	-	-	-	-	-	609.06	45.80	601.78	27.35	12						
West Newbury,	1897	185	October, 1897	2,011.29	777.0	251.75	-	-	-	-	-	-	10.10	385.00	-	-	3,136	62.72	2,365	747.73	1,271.14	-	-	-	-	-	-	-	-	19.79	7.50	307.89	29.51	13						
Westport,	1897	185	January, 1897	2,011.29	777.0	251.75	-	-	-	-	-	-	10.10	385.00	-	-	3,136	62.72	2,365	747.73	1,271.14	-	-	-	-	-	-	-	-	19.79	7.50	307.89	29.51	13						
Westport,	1897	185	December, 1897	880.47	3,110.8	1,283.60	11.90	73.37	36.00	79.86	2.96	163.72	-	-	-	-	8,069	161.38	6,052	2,007.00	2,984.47	122.20	19.67	-	-	-	-	235.50	134.15	10.74	3.00	39.44	24.00	2						
West Tibury,	1896	185	November, 1897	1,140.1	1,316.3	323.67	-	-	-	-	-	-	-	-	-	-	7,122	142.41	1,972	926.68	1,444.49	-	-	-	-	-	-	-	-	73.41	88.60	365.22	18.60	14						
West Tibury,	1897	308	December, 1897	2,111.88	907.7	361.25	-	-	-	-	-	-	-	-	-	-	5,000	108.27	2,461	1,112.33	1,600.78	-	-	-	-	-	-	-	-	14.67	102.41	377.66	36.90	15						
Weymouth,	1895	89	January, 1897	834.20	367.0	145.45	-	-	-	-	-	-	-	-	-	-	-	-	4.14	8.69	983.00	147.46	-	-	-	-	-	-	-	-	32.70	-	-	16						
Weymouth,	1896	185	October, 1897	933.95	5.9	2.00	-	-	-	-	-	-	-	-	-	-	855	17.31	781	160.16	233.62	-	-	-	-	-	-	-	-	-	55.00	86.05	-	17						
Weymouth,	1897	300	December, 1897	626.46	702.0	277.19	-	-	75	2.25	12.65	92.35	155.00	22.75	-	-	4,057	91.95	3,667	1,064.02	1,951.04	-	-	-	-	-	-	-	-	80.60	53.70	30.45	80.11	474.63	-	18				
Wilbraham,	1891	1881	November, 1897	2,724.14	140.0	50.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,802.61	214.32	-	19						
Wilbraham,	1897	185	January, 1897	70.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	89.29	10.02	-	20						
Wilbraham,	1897	185	December, 1897	367.70	2,186.0	863.48	-	-	62.10	5.00	35.00	-	-	-	-	-	4,116	82.32	3,000	1,161.16	2,120.65	221.00	37.57	-	-	-	-	-	51.00	32.40	18.65	41.72	856.11	-	21					
Williamstown,	1896	186	December, 1897	6,020.11	260.1	113.81	21.00	-	36.75	-	-	-	27.60	195.77	-	-	7,106	142.13	5,168	1,818.77	2,761.44	99.23	-	-	-	-	-	-	-	26.00	89.25	745.04	40.50	22						
Williamstown,	1896	186	December, 1897	1,011.01	1,910.21	581.00	-	-	214.92	38.80	190.31	1,544.00	1,081.22	1,050.0	346.50	-	5,067	127.34	3,618	1,266.17	3,067.47	315.00	46.80	-	-	-	-	-	-	11,290.48	-	-	-	23						
Windsor,	1897	250	December, 1897	1,772.92	1,655.6	612.56	71.10	122.69	71.40	213.21	11.60	49.06	249.90	143.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	610.0	180.60	26.34	16.25	12.80	173.80	-	24			
Worcester (Duxton),	1896	186	November, 1897	97.50	1,420.8	446.43	28.40	49.69	49.10	123.50	7.75	335.95	434.00	299.40	552.0	285.60	8,068	173.80	5,648	1,755.32	2,341.04	1,560.80	234.12	957.0	28.10	687.00	446.55	35.60	21.30	67.0	667.85	42.75	25							
Worcester (Duxton),	1897	185	December, 1897	1,104.4	666.72	101.80	178.15	73.29	219.60	25.00	175.90	200.00	129.00	-	-	-	1,430	80.80	3,094	1,035.05	1,439.42	1,418.56	242.78	882.0	308.70	119.00	77.35	32.00	98.00	43.05	143.38	546.05	38.1	26						
Worcester (Halden),	1897	185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25.75	-	-	27						
Wrentham,	1897	185	December, 1897	2,011.29	777.0	251.75	-	-	-	-	-	-	10.10	385.00	-	-	3,136	62.72	2,365	747.73	1,271.14	-	-	-	-	-	-	-	-	-	-	19.79	7.50	307.89	29.51	28				
Total,					\$99,144.329	360,186.1	\$80,029.91	5,778.09	\$10,188.71	3,457.16	\$14,037.19	2,566.78	\$10,047.36	29,552.50	\$17,232.00	3,849.6	\$1,227.10	573,303	\$11,900.42	395.40	136,326.34	\$217,033.37	61,286.50	\$8,002.35	39,846.4	\$13,614.02	9,000.24	\$5,432.39	9,085.10	\$6,218.20	\$8,567.68	\$9,335.78	\$97,816.36	\$1,600.00						
Yarmouth (North),	1896	186	June, 1897	1,177.96	1,070.0	428.60	3.00	5.25	-	-	-	3.30	154.68	-	-	-	8,913	178.20	6,368	1,809.19	3,019.71	-	-	-	-	-	-	-	-	-	-	55.00	33.00	306.00	172.90	4.90	123.63	245.63	-	29
Yarmouth (South),	1896	186	December, 1897	1,011.01	260.1	113.81	-	-	-	-	-	-	27.60	195.77	-	-	7,106	142.13	5,168	1,818.77	2,761.44	99.23	-	-	-	-	-	-	-	-	26.00	89.25	745.04	40.50	30					
Yarmouth (South),	1897	186	December, 1897	1,011.01	260.1	113.81	-	-	-	-	-	-	27.60	195.77	-	-	7,106	142.13	5,168	1,818.77	2,761.44	99.23	-	-	-	-	-	-	-	-	26.00	89.25	745.04	40.50	31					
Yarmouth (South),	1897	186	December, 1897	1,011.01	260.1	113.81	-	-	-	-	-	-	27.60	195.77	-	-	7,106	142.13	5,168	1,818.77	2,761.44	99.23	-	-	-	-	-	-	-	-	26.00	89.25	745.04	40.50	32					
Yarmouth (South),	1897	186	December, 1897	1,011.01	260.1	113.81	-	-	-	-	-	-	27.60	195.77	-	-	7,106	142.13	5,168	1,818.77	2,761.44	99.23	-	-	-	-	-	-	-	-	26.00	89.25	745.04	40.50	33					
Yarmouth (South),	1897	186	December, 1897	1,011.01	260.1	113.81	-	-	-	-	-	-	27.60	195.77	-	-	7,106	142.13	5,168	1,818.77	2,761.44	99.23	-	-	-	-	-	-	-	-	26.00	89.25	745.04							



APPENDIX H.

SHOWING THE ACTS AND RESOLVES UNDER
WHICH THE WORK OF THE COMMISSION
IS CARRIED ON.

[ACTS OF 1893, CHAPTER 476.]

AN ACT TO PROVIDE FOR THE APPOINTMENT OF A HIGH-
WAY COMMISSION TO IMPROVE THE PUBLIC ROADS AND
TO DEFINE ITS POWERS AND DUTIES.

Be it enacted, etc., as follows:

SECTION 1. The governor, with the advice and consent of the council, shall, within thirty days after the passage of this act, appoint three competent persons, to serve as the Massachusetts Highway Commission. Their terms of office shall be so arranged and designated at the time of their appointment that the term of one member shall expire in three years, one in two years and one in one year. The full term of office thereafter shall be for three years, and all vacancies occurring shall be filled by the governor, with the advice and consent of the council. The members of said board may be removed by the governor, with the advice and consent of the council, for such cause as he shall deem sufficient and shall express in the order of removal. They shall each receive in full compensation for their services an annual salary of two thousand dollars, payable in equal monthly instalments, and also their travelling expenses. They may expend annually for clerk hire, engineers and for defraying expenses incidental to and necessary for the performance of their duties, exclusive of office rent, the sum of two thousand dollars. They shall be provided with an office in the state house or some other suitable place in the city of Boston, in which the records of their office shall be kept. They may establish rules and regulations for the conduct of business and for carrying out the provisions of this act.

Massachusetts
Highway Com-
mission, ap-
pointment, term
of office, com-
pensation, etc.

To compile statistics, make investigations, advise officers, prepare maps, etc.

SECTION 2. They shall from time to time compile statistics relating to the public roads of cities, towns and counties, and make such investigations relating thereto as they shall deem expedient. They may be consulted at all reasonable times, without charge, by officers of counties, cities or towns having the care of and authority over public roads, and shall without charge advise them relative to the construction, repair, alteration or maintenance of the same; but advice given by them to any such officers shall not impair the legal duties and obligations of any county, city or town. They shall prepare a map or maps of the Commonwealth on which shall be shown county, city and town boundaries and also the public roads, particularly the state highways, giving, when practicable, the names of the same. They shall collect and collate information concerning the geological formation of this Commonwealth, so far as it relates to the material suitable and proper for road building, and shall, so far as practicable, designate on said map or maps the location of such material. Such map or maps shall at all reasonable times be open for the inspection of officers of counties, cities and towns having the care of and authority over public roads. They shall each year hold at least one public meeting in each county for the open discussion of questions relating to the public roads, due notice of which shall be given in the press or otherwise.

Massachusetts Highway Commission to hold public meetings.

Annual report, etc.

SECTION 3. They shall make an annual report to the legislature of their doings and the expenditures of their office, together with such statements, facts and explanations bearing upon the construction and maintenance of public roads, and such suggestions and recommendations as to the general policy of the Commonwealth in respect to the same as may seem to them appropriate. Their report shall be transmitted to the secretary of the Commonwealth on or before the first Wednesday in January of each year, to be laid before the legislature. All maps, plans and statistics collected and compiled under their direction shall be preserved in their office.

Officers to furnish commission with information.

SECTION 4. County commissioners and city and town officers having the care of and authority over public roads and bridges throughout the Commonwealth shall, on re-

quest, furnish the commissioners any information required by them concerning the roads and bridges within their jurisdiction.

SECTION 5. For the purpose of carrying out the provisions of this act said commission may expend such sums for necessary assistants, the procuring of necessary supplies, instruments, material, machinery and other property, and for the construction and maintenance of state highways, as shall from time to time be appropriated by the legislature; and they shall in their annual report state what sums they deem necessary for the year commencing with the first day of March following.

Expenditure.

SECTION 6. Whenever the county commissioners of a county adjudge that the common necessity and convenience require that the Commonwealth acquire as a state highway a new or an existing road in that county, they may apply by petition in writing to the Massachusetts highway commission, stating the road they recommend, and setting forth a detailed description of said road by metes and bounds, together with a plan and profile of the same. Said commission shall consider such petition, and if they adjudge that it ought to be allowed, they shall in writing so notify said county commissioners. It shall then become the duty of said county commissioners to cause said road to be surveyed and laid out in the manner provided for the laying out and alteration of highways, the entire expense thereof to be borne and paid by said county. Said county commissioners shall preserve a copy of such petition, plans and profiles with their records for public inspection. When said commission shall be satisfied that said county commissioners have properly surveyed and laid out said road, and set in place suitable monuments, and have furnished said commission with plans and profiles, on which shall be shown such monuments and established grades, in accordance with the rules and regulations of said commission, said commission may approve the same, and so notify in writing said county commissioners. Said commission shall then present a certified copy of said petition, on which their approval shall be indicated, together with their estimates for constructing said road and the estimated annual cost

State highway,
proceedings
upon petition
of county com-
missioners.
Repealed, 1894.

for maintaining the same, to the secretary of the Commonwealth, who shall at once lay the same before the legislature, if it is in session, otherwise on the second Wednesday of January following. If the legislature makes appropriation for constructing said road, said commission shall cause said road to be constructed in accordance with this act, and when completed and approved by them said road shall become a state highway, and thereafter be maintained by the Commonwealth under the supervision of said commission.

State highway,
proceedings
upon petition of
two or more
cities or towns.
Repealed, 1894.

SECTION 7. Two or more cities or towns may petition the said commission representing that, in their opinion, the common necessity and convenience require that the Commonwealth should acquire as a state highway a new or an existing road leading from one city or town to another, which petition shall be accompanied by a detailed description of such road by metes and bounds, and also a plan and profile of the same. If said commission adjudge that the common necessity and convenience require such road to be laid out and acquired as a state highway, they shall cause a copy of said petition, on which shall be their finding, to be given to the county commissioners of the county in which said road or any portion of it lies. It shall then become the duty of the county commissioners, at the expense of the county, to cause said road to be surveyed and laid out, and to set in place suitable monuments and to cause a detailed description by metes and bounds, plans and profiles to be made, on which shall be shown said monuments and established grades, and to give the same to said commission; but said county commissioners shall have the right to change the line of said road, provided the termini are substantially the same. Said county commissioners shall preserve said petition and a copy of the plans and profiles, with their records, for public inspection. When said commission shall be satisfied that the county commissioners have properly surveyed and laid out said road and set in place suitable monuments, and have furnished them with plans and profiles on which shall be shown said monuments and established grades, in accordance with the rules and regulations of said commission, they shall then proceed in

the same manner as provided in section six of this act; and when said road is completed and approved by said commission it shall become a state highway, and thereafter be maintained by the Commonwealth under the supervision of said commission.

SECTION 8. In all cases where a highway is to be constructed at the expense of the Commonwealth as a state highway, all the grading necessary to make said highway of the established grade, and the construction of culverts and bridges, shall be paid for by the county or counties, respectively, in which said highway or any portion of it lies, and the work must be done to the satisfaction of said commission. No action by a person claiming damage for the taking of land or change of grade, under the provisions of this act, shall be commenced against a county until said commission has taken possession for the purpose of constructing such state highway.

Grading, construction of culverts, bridges, etc., to be paid for by county. Repealed, 1894.

Action for damages.

SECTION 9. When appropriation has been made by the legislature for the construction of a state highway, said commission shall at once cause plans and specifications to be made and estimate the cost of the construction of such state highway, and give to each city and town in which said road lies, a certified copy of said plans and specifications, with a notice that said commission is ready for the construction of said road. Such city or town shall have the right, without advertisement, to contract with said commission for the construction of so much of such highway as lies within its limits, in accordance with the plans and specifications of the commission and under its supervision and subject to its approval, at a price agreed upon between said commission and said city or town; but such price agreed upon shall not exceed eighty-five per cent. of the original estimate of said commission. If such city or town shall within thirty days not elect to so contract, said commission may advertise in one or more papers published in the county where the road or portion of it is situated, and in one or more papers published in Boston, for bids for the construction of said highway in accordance with the plans and specifications furnished by said commission, and under their supervision and subject to their approval. Said commission shall

Proceedings when appropriation is made for construction. Repealed, 1894.

have the right to reject any and all bids, and they shall require of the contractor a bond for at least ten thousand dollars for each mile of road, to indemnify such city or town in which such highway lies against damage while such road is being constructed, and the Commonwealth shall not be liable for any damage occasioned thereby. Said commission shall make and sign all contracts in the name of the Massachusetts highway commission.

Maintenance.

SECTION 10. For the maintenance of state highways, said commission shall contract with the city or town in which such state highway lies, or a person, firm or corporation, for the keeping in repair and maintaining of such highway, in accordance with the rules and regulations of said commission, and subject to their supervision and approval, and such contracts may be made without previous advertisement.

**Contracts subject to approval of governor and council.
Repealed, 1894.**

SECTION 11. All contracts made by or with the Massachusetts highway commission under the provisions of this act shall be subject to the approval of the governor and council.

Rights of adjoining owner or occupant, etc.

SECTION 12. No length of possession, or occupancy of land within the limit of any state highway, by an owner or occupier of adjoining land, shall create a right to such land in any adjoining owner or occupant or a person claiming under him, and any fences, buildings, sheds or other obstructions encroaching upon such state highway shall, upon written notice by said commission, at once be removed by the owner or occupier of adjoining land, and if not so removed said commission may cause the same to be done and may remove the same upon the adjoining land of such owner or occupier.

**State highway, liability for injuries to property or persons, etc.
Repealed, 1894.**

SECTION 13. The Commonwealth shall be liable for injuries to persons or property occurring through a defect, or want of repair or of sufficient railing, in or upon a state highway.

Police jurisdiction, laying pipes, planting trees, etc.

SECTION 14. Cities and towns shall have police jurisdiction over all state highways, and they shall at once notify in writing the state commission or its employees of any defect or want of repair in such highways. No state highway shall be dug up for laying or placing pipes, sewers, posts, wires, railways or other purposes, and no

tree shall be planted or removed or obstruction placed thereon, except by the written consent of the superintendent of streets or road commissioners of a city or town, approved by the highway commission, and then only in accordance with the rules and regulations of said commission; and in all cases the work shall be executed under the supervision and to the satisfaction of said commission, and the entire expense of replacing the highway in as good condition as before shall be paid by the parties to whom the consent was given or by whom the work was done; but a city or town shall have the right to dig up such state highway without such approval of the highway commission where immediate necessity demands it, but in all such cases such highway shall be at once replaced in as good condition as before, and at the expense of the city or town. Said commission shall give suitable names to the state highways, and they shall have the right to change the name of any road that shall have become a part of a state highway. They shall cause to be erected, at convenient points along state highways, suitable guide posts.

Names, guide
posts, etc.

SECTION 15. The word "road," as used in this act includes every thoroughfare which the public has a right to use.

The word
"road" defined.

SECTION 16. This act shall take effect upon its passage.

Approved June 10, 1893.

[ACTS OF 1894, CHAPTER 497.]

AN ACT RELATING TO STATE HIGHWAYS.

Be it enacted, etc., as follows:

SECTION 1. Whenever the county commissioners of a county, or the mayor and aldermen of a city, or the selectmen of a town, adjudge that the public necessity and convenience require that the Commonwealth take charge of a new or an existing road as a highway, in whole or in part, in that county, city or town, they may apply by a petition in writing to the Massachusetts highway commission, stating the road they recommend, together with a plan and profile of the same.

Petition for the
taking of certain
roads as state
highways.

Proceedings of
highway com-
missioners upon
petition, etc.

SECTION 2. Said highway commission shall consider such petition and determine what the public necessity and convenience require in the premises, and, if they deem that the highway should be laid out or be taken charge of by the Commonwealth, shall file a plan thereof in the office of the county commissioners of the county in which the petitioners reside, with the petition therefor and a certificate that they have laid out and taken charge of said highway in accordance with said plan, and shall file a copy of the plan and location of the portion lying in each city or town in the office of the clerk of said city or town, and said highway shall, after the filing of said plans, be laid out as a highway, and shall be constructed and kept in good repair and condition as a highway by the said commission, at the expense of the Commonwealth, and shall be known as a state road, and thereafter be maintained by the Commonwealth under the supervision of said commission. And all openings and placing of structures in any such road shall be done in accordance with a permit from said commission.

Damages.

SECTION 3. The damages sustained by any person whose property is taken for, or is injured by the construction of any such highway shall be paid by the Commonwealth, the same to be determined by said commission. And if said commission and the person sustaining the damages cannot agree thereon he or they may have said damages determined by a jury in the county in which the land is situated, by filing a petition for such jury in the office of the clerk of the superior court for said county at any time before the expiration of one year from the completion of said highway, and thereupon said damages shall be determined by a jury at the bar of said court, in the same manner as damages for the taking of land for other highways in the county, city or town are determined; and costs shall be taxed to the prevailing party on such petition, as in civil cases.

Construction of
highways,
notice to cities
and towns, bids,
proposals, etc.

SECTION 4. Said commission shall, when about to construct any highway, give to each city and town in which said highway lies a certified copy of the plans and specifications for said highway, with a notice that said commission is ready for the construction of said road. Such city

or town shall have the right, without advertisement, to contract with said commission for the construction of so much of such highway as lies within its limits, in accordance with the plans and specifications, and under its supervision and subject to its approval, at a price agreed upon between said commission and said city or town. If said city or town shall not elect to so contract within thirty days said commission shall advertise in two or more papers published in the county where the road or portion of it is situated, and in three or more daily papers published in Boston, for bids for the construction of said highway under their supervision and subject to their approval, in accordance with plans and specifications to be furnished by said commission. Such advertisements shall state the time and place for opening the proposals in answer to said advertisements, and reserve the right to reject any and all proposals. All such proposals shall be sealed and shall be kept by the board, and shall be open to public inspection after said proposals have been accepted or rejected. Said commission may reject any or all bids, or if a bid is satisfactory they shall, with the approval of the governor and council, make a contract in writing on behalf of the Commonwealth for said construction, and shall require of the contractor a bond for at least twenty-five per cent. of the contract price to indemnify any city or town in which such highway lies against damage while such road is being constructed; and the Commonwealth shall not be liable for any damage occasioned thereby. All construction of state roads shall be fairly apportioned by said commission among the different counties, and not more than ten miles of state road shall be constructed in any one county in any one year on petition as aforesaid, without the previous approval thereof in writing by the governor and council.

Construction to be apportioned among the different counties.

SECTION 5. One quarter of any money expended under the provisions of this act in any county for a highway, with interest on said quarter at the rate of three per cent. per annum, shall be repaid by said county to the Commonwealth, in such reasonable sums and at such times within six years thereafter as said commission, with the approval of the state auditor, shall determine, taking into

Portion of money expended to be repaid by county, etc.

consideration the financial condition of the county; and the treasurer and receiver-general shall apply all money so repaid to the appropriation to be expended by said commission. The county treasurer, with the approval of the county commissioners, may make such loans as they may see fit to meet this expenditure.

Cities and towns
to be liable for
injuries to per-
sons, etc.

SECTION 6. Any city or town in which a state highway is situated shall be liable for injuries to persons travelling upon a state highway the same as upon other highways, but the amount actually recovered as damages for such injuries shall be repaid within one year thereafter to such city or town by the Commonwealth. A city or town may make temporary necessary repairs of a state highway without the approval of said commission.

Shade trees,
watering
troughs, etc.

SECTION 7. Said commission shall keep all state roads reasonably clear of brush, and shall cause suitable shade trees to be set out along said highways when feasible, and shall renew the same when necessary, and may also establish and maintain watering troughs at suitable places along said highways.

State Highway
Loan.

SECTION 8. For the purpose of meeting any expenses that may be incurred under the provisions of chapter four hundred and seventy-six of the acts of the year eighteen hundred and ninety-three, as hereby amended, including the salaries and expenses of the commission, the treasurer and receiver-general is hereby authorized, with the approval of the governor and council, to issue scrip or certificates of indebtedness to an amount not exceeding three hundred thousand dollars, for a term not exceeding thirty years. Said scrip or certificates of indebtedness shall be issued as registered bonds or with interest coupons attached, and shall bear interest not exceeding four per centum per annum, payable semi-annually on the first days of April and October in each year. Such scrip or certificates of indebtedness shall be designated on the face as the State Highway Loan, shall be countersigned by the governor, and shall be deemed a pledge of the faith and credit of the Commonwealth, and the principal and interest shall be paid at the times specified therein in gold coin of the United States or its equivalent; and said

scrip or certificates of indebtedness shall be sold and disposed of at public auction or in such other mode and at such times and prices and in such amounts and at such rates of interest, not exceeding the rate above specified, as shall be deemed best. The treasurer and receiver-general shall, on issuing any of said scrip or certificates of indebtedness, establish a sinking fund for the payment of said bonds, into which shall be paid any premiums received on the sale of said bonds, and he shall apportion thereto from year to year, in addition, amounts sufficient with the accumulations to extinguish at maturity the debt incurred by the issue of said bonds. The amount necessary to meet the annual sinking fund requirements and to pay the interest on said bonds shall be raised by taxation from year to year. Sinking fund.

SECTION 9. Sections six, seven, eight, nine, eleven Repeal. and thirteen of chapter four hundred and seventy-six of the acts of the year eighteen hundred and ninety-three are hereby repealed.

SECTION 10. This act shall take effect upon its passage.

Approved June 20, 1894.

[ACTS OF 1895, CHAPTER 92.]

AN ACT MAKING APPROPRIATIONS FOR EXPENSES OF THE
MASSACHUSETTS HIGHWAY COMMISSION.

Be it enacted, etc., as follows:

SECTION 1. The sums hereinafter mentioned are ap- Appropriations.
propriated, to be paid out of the state highway loan fund, to meet expenses of the Massachusetts highway commission for the year ending on the thirty-first day of December in the year eighteen hundred and ninety-five, to wit:—

For rent of office, including care, heating and lighting Highway com-
mission, rent,
etc.
the same, a sum not exceeding one thousand dollars, this amount being in addition to the sum heretofore appropriated for rent in an act passed the present year.

For the salaries of clerks and such clerical assistance Clerks.
as said commission may find necessary, a sum not exceeding five thousand dollars.

- Chief engineer. For the salary of the chief engineer, a sum not exceeding three thousand dollars.
- Incidental expenses. For incidental and contingent expenses of said commission, a sum not exceeding fifteen hundred dollars.
- Travelling expenses. For travelling expenses of said commission, a sum not exceeding fifteen hundred dollars.
- Surveys of roads. For expenses in connection with surveys of roads, for the purpose of laying out and building state highways, a sum not exceeding ten thousand dollars.

SECTION 2. This act shall take effect upon its passage.

Approved March 7, 1895.

[ACTS OF 1895, CHAPTER 347.]

AN ACT RELATIVE TO THE CONSTRUCTION OF STATE HIGHWAYS.

Be it enacted, etc., as follows:

- Construction of state highways. SECTION 1. The Massachusetts highway commission is hereby authorized to expend a sum not exceeding four hundred thousand dollars for the construction of state highways during the current year, in accordance with the provisions of chapter four hundred and seventy-six of the acts of the year eighteen hundred and ninety-three and chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four.
- No persons except citizens to be employed. SECTION 2. No persons except citizens of this Commonwealth shall be employed on the work authorized by this act.
- State Highway Loan. SECTION 3. For the purpose of meeting any expenses which may be incurred under the provisions of this act the treasurer and receiver-general is hereby authorized, with the approval of the governor and council, to issue scrip or certificates of indebtedness to an amount not exceeding four hundred thousand dollars, for a term not exceeding thirty years. Said scrip or certificates of indebtedness shall be issued as registered bonds or with interest coupons attached, and shall bear interest not exceeding four per cent. per annum, payable semi-annually on the first days of April and October in each year. Such scrip or certificates of indebtedness shall be desig-

nated on their face as the State Highway Loan, shall be countersigned by the governor, and shall be deemed the pledge of the faith and credit of the Commonwealth; and the principal and interest thereof shall be paid at the times specified therein in gold coin of the United States or its equivalent; and said scrip or certificates of indebtedness shall be sold and disposed of at public auction, or in such other manner, at such times and prices, in such amounts and at such rates of interest, not exceeding the rate above specified, as shall be deemed best. The sinking fund established by chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four shall also be maintained for the purpose of extinguishing bonds issued under the authority of this act, and the treasurer and receiver-general shall apportion thereto from year to year an amount sufficient with the accumulations of said fund to extinguish at maturity the debt incurred by the issue of said bonds. The amount necessary to meet the annual sinking fund requirements and to pay the interest on said bonds shall be raised by taxation from year to year.

SECTION 4. This act shall take effect upon its passage.

Approved May 1, 1895.

[ACTS OF 1895, CHAPTER 486.]

AN ACT RELATIVE TO THE CONSTRUCTION OF MACADAMIZED
ROADS IN TOWNS.

Be it enacted, etc., as follows:

SECTION 1. When a town of not less than ten thousand inhabitants, or not less than two nor more than five adjoining towns whose combined population does not exceed twelve thousand, vote at a town meeting to expend not less than three thousand dollars per year each year for the term of five years, in the case of a single town, or four thousand dollars each year for the term of five years when not less than two nor more than five towns unite together, for macadamized roads, the Commonwealth shall furnish out of the state highway loan authorized by chapter three hundred and forty-seven of the acts of the present

Commonwealth
to furnish
certain towns
with steam road
rollers.

year, through the Massachusetts highway commission, to such town or towns, free of charge a steam road roller of approved pattern and suitable size, for the sole use of such town or towns during said five years and as long thereafter as they continue to expend not less than fifty per cent. of the above-mentioned sum on macadamized roads each year: *provided, nevertheless*, that if said town or towns fail to expend said sum for macadamized roads in any one year, such road roller shall then revert to the Commonwealth. Said town or towns shall keep said roller in good repair.

Proviso.

Joint use of rollers by certain towns.

SECTION 2. When not less than two nor more than five towns use a roller jointly, the town voting the largest proportion of the required sum shall have the first chance as to the time of using it, and may retain possession of it each year for a length of time proportionate to the sum voted by said town. The six months between the first day of May and the first day of November in each year shall be deemed the proper period for macadamizing roads.

Period for macadamizing roads.

Amount to be expended.

SECTION 3. The Massachusetts highway commission shall not expend more than nine thousand dollars in carrying out the provisions of this act during the year eighteen hundred and ninety-five.

SECTION 4. This act shall take effect upon its passage.

Approved June 5, 1895.

[RESOLVES OF 1896, CHAPTER 86.]

RESOLVE RELATIVE TO A STATE HIGHWAY BETWEEN THE CITY OF BOSTON AND THE CITY OF NEWBURYPORT.

State highway between Boston and Newburyport.

Resolved, That the Massachusetts highway commission consider the expediency of laying out a state highway between the city of Boston and the city of Salem or the city of Newburyport, over the shore route, so called, which route may be described substantially as follows:—

Starting from the south ferry, at Lewis street, in Boston, thence through Lewis street to Maverick square, thence through Maverick square to Chelsea street, thence over Chelsea street to Bennington street, thence over

Bennington street to Orient Heights, thence over the main traveled road to the town of Revere, continuing on the main road to Beachmont, continuing over the main traveled road, known as Ocean avenue, along the ocean front to the Point of Pines, crossing the Saugus river on the easterly side of the Boston, Revere Beach and Lynn railroad and running to the south end of Sea street in Lynn, thence through Sea street to Broad street, thence through Broad street to Lewis street, thence through Lewis street to New Ocean street, thence through New Ocean street to the town of Swampscott, thence through New Ocean street, in Swampscott, to the junction of Burrill street and Paradise road, thence over Paradise road to the north-east end of said road, thence through Paradise woods on nearly a straight line to Vinin square, at the junction of the towns of Swampscott and Marblehead and the city of Salem, thence northerly to Loring avenue in the city of Salem, thence over Loring avenue to Lafayette street, thence over Lafayette street to Central street, thence over Central street to Essex street, thence through Salem to and over Beverly bridge, thence through the city of Beverly, and thence to Newburyport, using the present traveled roads as far as may be, with such additions of new road as may be necessary. Said Massachusetts highway commission shall report to the next general court the probable cost of such a highway, with such other information as may be obtained in relation thereto, on or before the thirty-first day of January in the year eighteen hundred and ninety-seven.

Approved April 28, 1896.

[ACTS OF 1896, CHAPTER 345.]

AN ACT RELATIVE TO STATE HIGHWAYS.

Be it enacted, etc., as follows:

SECTION 1. When a highway is laid out as a state road the Massachusetts highway commission shall construct and maintain that portion of the way between the inside lines of sidewalks upon either side. The sidewalks of said road may be constructed and maintained in accordance with the

Construction,
etc., of state
highways.

Sidewalks.

Public Statutes and amendments thereto, and the provisions of section six of chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four shall only apply to that portion of the way between the inside lines of sidewalks. The inside lines of sidewalks referred to in this section are those lines which are nearest to the centre of the highway.

State roads to be kept clear of snow and ice, etc.

SECTION 2. A city or town in which a state road lies shall at its own expense keep such road sufficiently clear of snow and ice so that the same shall be reasonably safe for travel, as now required by the Public Statutes and amendments thereto.

Copy of petition may be filed with county commissioners.

SECTION 3. Instead of filing the original petition with the county commissioners, as now required by section two of chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four, it shall hereafter be sufficient to file a certified copy thereof with said county commissioners.

SECTION 4. This act shall take effect upon its passage.

Approved April 28, 1896.

[ACTS OF 1896, CHAPTER 481.]

AN ACT RELATIVE TO THE CONSTRUCTION OF STATE HIGHWAYS.

Be it enacted, etc., as follows :

Construction of state highways.

SECTION 1. The Massachusetts highway commission is hereby authorized to expend a sum not exceeding six hundred thousand dollars for the construction of state highways, in accordance with the provisions of chapter four hundred and seventy-six of the acts of the year eighteen hundred and ninety-three and chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four.

Only citizens of the Commonwealth to be employed.

SECTION 2. No persons except citizens of this Commonwealth shall be employed on the work authorized by this act.

State Highway Loan.

SECTION 3. For the purpose of meeting any expenses which may be incurred under the provisions of this act the treasurer and receiver general is hereby authorized,

with the approval of the governor and council, to issue scrip or certificates of indebtedness to an amount not exceeding six hundred thousand dollars, for a term not exceeding thirty years. Said scrip or certificates of indebtedness shall be issued as registered bonds or with interest coupons attached, and shall bear interest not exceeding four per cent. per annum, payable semi-annually on the first day of April and of October in each year. Such scrip or certificates of indebtedness shall be designated on their face as the State Highway Loan, shall be countersigned by the governor, and shall be deemed a pledge of the faith and credit of the Commonwealth; and the principal and interest thereof shall be paid at the times specified therein in gold coin of the United States or its equivalent, and said scrip or certificates of indebtedness shall be sold and disposed of at public auction, or in such other manner, at such times and prices, in such amounts and at such rates of interest, not exceeding the rate above-specified, as shall be deemed best. The sinking fund ^{Sinking fund, etc.} established by chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four shall also be maintained for the purpose of extinguishing bonds issued under the authority of this act, and the treasurer and receiver general shall apportion thereto from year to year an amount sufficient with the accumulations of said fund to extinguish at maturity the debt incurred by the issue of said bonds. The amount necessary to meet the annual sinking fund requirements and to pay the interest on said bonds shall be raised by taxation from year to year.

SECTION 4. This act shall take effect upon its passage.

Approved June 4, 1896.

[ACTS OF 1896, CHAPTER 513.]

AN ACT TO PROVIDE FOR AIDING TOWNS IN THE CONSTRUCTION AND MAINTENANCE OF BETTER ROADS.

Be it enacted, etc., as follows:

SECTION 1. Upon the application to the Massachusetts highway commission of the county commissioners of any ^{Road machines to be furnished at the expense}

of the Commonwealth for use in certain towns, etc.

county, made at the request of any town of not more than twelve thousand inhabitants within said county, there shall be furnished by said highway commission to said county, at the expense of the Commonwealth, one or more steam rollers, portable stone crushers and such other road machines as the said highway commission may deem necessary for the construction and maintenance of better roads in the town making such request. Such machines shall remain the property of the Commonwealth and shall be managed and maintained under the direction of the county commissioners. The county commissioners shall engage competent engineers and skilled mechanics to operate said machines, who shall be paid from the county treasury such sums for each day's actual services as the county commissioners may determine. The expenses so incurred shall be repaid to the county by the towns using said machines, as apportioned by the county commissioners, in proportion to the time in which such machines were used by them.

Repeal.

SECTION 2. Chapter four hundred and eighty-six of the acts of the year eighteen hundred and ninety-five is hereby repealed.

SECTION 3. This act shall take effect upon its passage.

Approved June 6, 1896.

[ACTS OF 1896, CHAPTER 541.]

AN ACT RELATIVE TO STREET RAILWAYS LOCATED ON STATE HIGHWAYS.

Be it enacted, etc., as follows :

Location of street railways on state highways may be changed, etc.

SECTION 1. Whenever in the construction of a state highway it becomes necessary, in the opinion of the Massachusetts highway commission, to change the location, relay or change the grade of that part of any street railway located on said highway, or to place different material between its tracks, or to make any other change in the location and construction of said railway, said commission may, in the manner provided in section twenty-two of chapter one hundred and thirteen of the Public Statutes for making such changes by boards of aldermen and select-

men, order the company owning or operating said railway to make such changes : *provided, however,* that the company shall thereafter enjoy the same rights in the new location that it had in the original location ; and unless the same are made within the time limited by said commission the commission may make said changes, and the cost of making the same, whether by the railway company or by said commission, shall be paid by said commission ; said cost with interest at a rate not exceeding four per cent. per annum, shall be paid by said railway company to the Commonwealth in ten equal annual payments ; and the auditor of the Commonwealth on or before the first day of July in each year shall certify the amount due to the tax commissioner, who shall forthwith demand the same ; and payment shall be made within thirty days thereafter. The claim of the Commonwealth shall have priority over all other claims against said railway company, except for labor, and shall be collected in the same manner as the corporation tax ; but any such company may itself pay for the expenses of said changes at the time of making the same, and may anticipate said annual payments in whole or in part.

SECTION 2. This act shall take effect upon its passage.
Approved June 9, 1896.

[ACTS OF 1896, CHAPTER 548.]

AN ACT MAKING APPROPRIATIONS FOR EXPENSES AUTHORIZED BY THE PRESENT LEGISLATURE AND FOR CERTAIN OTHER EXPENSES AUTHORIZED BY LAW.

Be it enacted, etc., as follows :

.
For expenses in connection with aiding towns in the construction and maintenance of better roads, as authorized by chapter five hundred and thirteen of the acts of the present year, a sum not exceeding twelve thousand dollars.

Construction of better roads.

.
SECTION 2. This act shall take effect upon its passage.
Approved June 9, 1896.

[ACTS OF 1897, CHAPTER 15.]

AN ACT MAKING AN APPROPRIATION FOR THE STATE
HIGHWAY LOAN SINKING FUND.*Be it enacted, etc., as follows :*Appropriation
of \$28,372 for
State Highway
Loan Sinking
Fund.

SECTION 1. The sum of twenty-eight thousand three hundred and seventy-two dollars is hereby appropriated, to be paid out of the treasury of the Commonwealth from the ordinary revenue, for the State Highway Loan Sinking Fund, as provided for in section eight of chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four, said sum being the estimate of the treasurer and receiver-general.

SECTION 2. This act shall take effect upon its passage.

Approved February 2, 1897.

[ACTS OF 1897, CHAPTER 276.]

AN ACT TO PERMIT THE RELOCATION OF A CERTAIN HIGH-
WAY OVER THE LAND OF THE TRUSTEES OF THE WEST-
BOROUGH INSANE HOSPITAL.*Be it enacted, etc., as follows :*Highway over
Westborough
insane hospital
land, etc.

SECTION 1. The trustees of the Westborough insane hospital are hereby authorized to permit the relocation of the highway leading over land of the said trustees, past the buildings of the Westborough insane hospital, over other land of the said trustees, in such place and according to such plan as the said trustees may approve. And the Massachusetts highway commission may relocate and build said highway during the year eighteen hundred and ninety-seven, and may pay for building the same out of any funds that may hereafter be authorized to be expended by said commission.

SECTION 2. This act shall take effect upon its passage.

Approved April 14, 1897.

[ACTS OF 1897, CHAPTER 340.]

AN ACT RELATIVE TO THE CONSTRUCTION AND REPAIR OF
STATE HIGHWAYS.*Be it enacted, etc., as follows :*

SECTION 1. The Massachusetts highway commission is hereby authorized to expend a sum not exceeding eight hundred thousand dollars for the construction and repair of state highways, in accordance with the provisions of the statutes relating to and defining the powers and duties of said commission. Said commission may make contracts during the present calendar year for the whole amount hereby authorized to be expended, but the contracts shall be so made that the amount to be paid from the state treasury during the present calendar year shall not exceed six hundred thousand dollars.

Highway
Commission
may expend
\$800,000.

\$600,000 only to
be used in 1897.

SECTION 2. No persons except citizens of this Commonwealth shall be employed on the work authorized by this act.

Citizens of
Massachusetts
only to be
employed.

SECTION 3. For the purpose of meeting any expenses which may be incurred under the provisions of this act the treasurer and receiver-general is hereby authorized, with the approval of the governor and council, to issue scrip or certificates of indebtedness to an amount not exceeding eight hundred thousand dollars, for a term not exceeding thirty years. Said scrip or certificates of indebtedness shall be issued as registered bonds or with interest coupons attached, and shall bear interest not exceeding four per cent. per annum, payable semi-annually on the first days of April and October in each year. Such scrip or certificates of indebtedness shall be designated on their face as the State Highway Loan, shall be countersigned by the governor, and shall be deemed a pledge of the faith and credit of the Commonwealth; and the principal and interest thereof shall be paid at the times specified therein in gold coin of the United States or its equivalent, and said scrip or certificates of indebtedness shall be sold and disposed of at public auction, or in such other manner, at such times and prices, in such amounts and at such rates of interest, not exceeding the

Loan authorized
of \$800,000, not
exceeding 30
years, not ex-
ceeding 4 per
cent. interest,
April and
October.

State Highway
Loan.

Gold coin of the
United States or
its equivalent.

Sinking fund
already estab-
lished to cover
this loan.

rate above-specified, as shall be deemed best. The sinking fund established by chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four shall also be maintained for the purpose of extinguishing bonds issued under the authority of this act, and the treasurer and receiver general shall apportion thereto from year to year an amount sufficient with the accumulations of said fund to extinguish at maturity the debt incurred by the issue of said bonds. The amount necessary to meet the annual sinking fund requirements and to pay the interest on said bonds shall be raised by taxation from year to year.

Amount
necessary to
be raised by
taxation.

SECTION 4. This act shall take effect upon its passage.

Approved May 5, 1897.

[ACTS OF 1897, CHAPTER 355.]

AN ACT RELATIVE TO STATE HIGHWAYS.

Be it enacted, etc., as follows :

Chap. 497, 1894,
amended.

SECTION 1. Section two of chapter four hundred and ninety-seven of the acts of the year eighteen hundred and ninety-four is hereby amended by inserting after the word "file", in the fifth line of said section, the words:—a certified copy of,—and by striking out the last sentence of said section and inserting in place thereof the words:—No opening shall be made in any such road, nor any structure placed therein, nor shall there be made any change or removal of structures already placed therein, except with the approval of and in accordance with a permit from said commission, which shall exercise complete and permanent jurisdiction over state highways,—so as to read as follows:—*Section 2.* Said highway commission shall consider such petition and determine what the public necessity and convenience require in the premises, and, if they deem that the highway should be laid out or be taken charge of by the Commonwealth, shall file a certified copy of a plan thereof in the office of the county commissioners of the county in which the petitioners reside, with the petition therefor and a certificate that they have laid out and taken charge

Highway com-
missioners to
receive petitions
for highways,
and their duties
in such cases
defined.

of said highway in accordance with said plan, and shall file a copy of the plan and location of the portion lying in each city or town in the office of the clerk of said city or town, and said highway shall, after the filing of said plans, be laid out as a highway, and shall be constructed and kept in good repair and condition as a highway by said commission, at the expense of the Commonwealth, and shall be known as a state road, and thereafter be maintained by the Commonwealth under the supervision of said commission. No opening shall be made in any such road, nor any structure placed therein, nor shall there be made any change or removal of structures already placed therein, except with the approval of and in accordance with a permit from said commission, which shall exercise complete and permanent jurisdiction over state highways.

SECTION 2. Section four of said chapter four hundred and ninety-seven is hereby amended by inserting after the word "thereby", in the thirty-third line, the words:—The commission shall also have power to contract in the manner and under the conditions hereinbefore specified with a city or town, or with private bidders when a city or town shall not elect so to contract, for the grading of a state highway, or for furnishing materials or any other element in the construction of such highway,—so as to read as follows:—*Section 4.* Said commission shall, when about to construct any highway, give to each city and town in which said highway lies a certified copy of the plans and specifications for said highway, with a notice that said commission is ready for the construction of said road. Such city or town shall have the right, without advertisement, to contract with said commission for the construction of so much of such highway as lies within its limits, in accordance with the plans and specifications, and under its supervision and subject to its approval, at a price agreed upon between said commission and said city or town. If said city or town shall not elect to so contract within thirty days said commission shall advertise in two or more papers published in the county where the road or portion of it is situated, and in three or more daily papers published in

Chap. 497, 1894,
amended.

Commission to
furnish plans
to towns and
cities, etc.

Cities and towns
may contract
with commis-
sion to construct
highways.

Commission
may advertise
for bids in
certain cases.

Boston, for bids for the construction of said highway under their supervision and subject to their approval, in accordance with plans and specifications to be furnished by said commission. Such advertisement shall state the time and place for opening the proposals in answer to said advertisements, and reserve the right to reject any and all proposals. All such proposals shall be sealed and shall be kept by the board, and shall be open to public inspection after said proposals have been accepted or rejected. Said commission may reject any or all bids, or if a bid is satisfactory they shall, with the approval of the governor and council, make a contract in writing on behalf of the Commonwealth for said construction, and shall require of the contractor a bond for at least twenty-five per cent. of the contract price to indemnify any city or town in which such highway lies, against damage while such road is being constructed; and the Commonwealth shall not be liable for any damage occasioned thereby. The commission shall also have power to contract in the manner and under the conditions hereinbefore specified, with a city or town, or with private bidders when a city or town shall not elect so to contract, for the grading of a state highway, or for furnishing materials or any other element in the construction of such highway. All construction of state roads shall be fairly apportioned by said commission among the different counties, and not more than ten miles of state road shall be constructed in any one county in any one year on petition as aforesaid, without the previous approval thereof in writing by the governor and council.

May reject bids.

Not more than 10 miles of road to be constructed in any county in any one year unless, etc.

Chap. 513, 1896, amended.

Commission may furnish counties, at expense of Commonwealth, steam rollers, crushers, etc.

SECTION 3. Section one of chapter five hundred and thirteen of the acts of the year eighteen hundred and ninety-six is hereby amended by striking out the whole of said section and inserting in place thereof the following: —
Section 1. Upon the application to the Massachusetts highway commission of the county commissioners of any county, made at the request of any town of not more than twelve thousand inhabitants within said county, there shall be furnished by said highway commission to said county, at the expense of the Commonwealth, such steam rollers, portable stone crushers, and other road machines

as the said highway commission may deem necessary for the construction and maintenance of better roads in the county from which such a request comes. Such machines shall remain the property of the Commonwealth and shall be managed and maintained under the direction of the county commissioners, and they shall at all times be cared for in a manner satisfactory to the highway commission. The county commissioners shall engage competent engineers and skilled mechanics to operate said machines, who shall be paid from the county treasury such sums for each day's actual services as the county commissioners may determine. The expenses so incurred shall be repaid to the county by the Commonwealth or by the towns using said machines, as apportioned by the county commissioners, in proportion to the time during which such machines were used by such towns. Whenever any part of a state highway shall have been constructed in a county where there is road machinery purchased under the provisions of this act the highway commission shall have the right to use said machinery at such times as said road machinery is not in use by any town, for the maintenance and repair of such highway.

Such machines to remain property of Commonwealth under care of county commissioners, etc.

Expenses of said machines to be repaid by counties or towns.

Commission has right to use said machines.

SECTION 4. The provisions of section one of chapter five hundred and forty-one of the acts of the year eighteen hundred and ninety-six shall apply to the repair of a state highway as well as to the construction thereof.

SECTION 5. All payments made to the Commonwealth under the provisions of said chapter five hundred and forty-one shall be credited to the fund for the construction of state highways: *provided*, that such a fund exists at the time the payment is made, otherwise they shall be credited to the general fund of the Commonwealth.

Approved May 6, 1897.

[RESOLVES OF 1897, CHAPTER 95.]

RESOLVE TO PROVIDE FOR ADDITIONAL COPIES OF THE REPORT OF THE MASSACHUSETTS HIGHWAY COMMISSION.

Resolved, That two thousand additional copies of the fourth annual report of the Massachusetts highway com-

2,000 additional copies of report to be printed.

mission be printed and bound in cloth. Out of the number so printed each member of the present general court shall be entitled to receive five copies, and the residue shall be distributed under the direction of the commission. Beginning with the year eighteen hundred and ninety-eight there shall be printed annually four thousand copies of the report of said commission, and each member of the general court shall be entitled to receive ten copies.

Approved June 11, 1897.

APPENDIX J.

TABLES SHOWING VALUATIONS OF CITIES AND TOWNS
THROUGHOUT THE STATE, WITH AMOUNTS AP-
PROPRIATED FOR REPAIR AND CONSTRUCTION OF
ROADS AND BRIDGES, IN 1897.

The following tables, showing the valuation of the different cities and towns throughout the State, together with the amounts appropriated for the repair and construction of roads and bridges, are as complete as can be prepared from the data secured by correspondence with the officials of the various municipalities, and have been prepared in accordance with the following order, passed by the Legislature April 9, 1897: —

Ordered, That the Massachusetts Highway Commission be requested to give in its next annual report a tabulated statement of the appropriations made by the various towns and cities of the State for the repair and construction of roads and bridges during the year 1897.

BARNSTABLE COUNTY.

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
Barnstable, .	\$200	\$9,900	\$300	\$10,400	\$2,684,956	\$1,258,990	\$3,943,946	\$12 00
Bourne, .	133,920	6,550	1,000	41,470	1,526,800	373,775	1,900,575	10 80
Brewster, .	—	—	—	1,200	382,355	150,915	533,270	13 00
Chatham, .	220	2,230	325	2,775	713,025	123,308	836,333	17 00
Dennis, .	—	2,000	500	2,500	776,469	328,651	1,105,120	13 80
Eastham, .	—	475	25	500	243,761	53,806	297,567	9 60
Falmouth, .	350	12,625	300	13,275	2,480,060	4,034,258	6,514,318	8 30
Harwich, .	—	3,200	4,300	7,500	856,360	231,894	1,088,254	14 90
Mashpee, .	75	2 650	—	725	191,070	7,370	198,440	12 40
Orleans, .	—	1,500	—	1,500	429,205	132,767	561,972	14 00
Provincetown, .	—	2,500	—	2,500	1,161,775	709,321	1,871,096	17 00
Sandwich, .	500	2,000	—	2,500	748,825	174,875	923,700	16 00
Truro, .	—	1,350	—	1,350	215,585	110,940	326,525	16 00
Wellfleet, .	—	—	—	1,500	445,467	173,833	619,300	10 00
Yarmouth, .	—	1 100	—	2 6,100	834,775	721,150	1,555,925	11 00
Total, .	\$35,265	\$46,080	\$6,750	\$95,795	\$13,690,488	\$8,585,853	\$22,276,341	—
Average, .	—	—	—	6,386	912,699	572,390	1,485,089	\$13 05

BERKSHIRE COUNTY.

Adams, .	\$3,000	\$7,500	\$1,000	\$13,500	\$2,760,515	\$1,719,438	\$4,479,953	\$16 00
Alford, .	—	—	—	400	129,417	42,216	171,633	8 00
Becket, .	—	—	—	2,000	290,040	120,976	411,016	16 00

Cheshire,	-	-	-	1,800	551,963	125,342	677,305	15 00
Clarksburg,	-	-	-	800	173,257	48,827	222,084	20 00
Dalton,	350	3,500	800	4,650	1,474,332	933,606	2,407,938	15 50
Egremont,	-	1,000	-	850	362,067	72,059	434,126	10 20
Florida,	-	6,000	-	1,000	135,648	16,364	152,012	22 00
Great Barrington,	800	-	-	6,800	2,484,765	907,555	3,392,320	10 00
Hancock,	-	-	-	1,000	267,641	34,113	301,754	9 40
Hinsdale,	-	900	300	1,500	483,468	146,425	629,893	17 00
Lanesborough,	-	-	-	1,300	405,134	54,255	459,389	14 50
Lee,	-	-	-	5,000	1,315,389	407,693	1,723,082	19 00
Lenox,	6,000	-	4,500	10,500	2,900,480	705,005	3,605,485	14 50
Monterey,	-	700	-	700	193,385	35,770	229,155	18 00
Mount Washington,	-	-	-	350	76,644	4,893	81,542	14 00
New Ashford,	-	200	-	200	49,410	6,525	55,935	17 30
New Marlborough,	1,000	2,000	-	3,000	367,977	133,663	501,640	19 00
Otis,	-	1,000	-	1,000	164,938	36,594	201,532	12 00
Peru,	-	600	-	600	97,970	17,015	114,985	15 55
Richmond,	-	-	-	1,200	43,372	285,298	328,670	17 00
Sandisfield,	-	-	-	1,800	268,105	70,855	338,960	14 60
Savoy,	-	1,400	-	1,400	129,275	26,796	156,071	22 00
Sheffield,	-	-	-	2,700	743,120	117,020	860,140	14 50
Stockbridge,	-	-	-	10,000	2,356,320	765,387	3,121,707	12 40
Tyringham,	-	-	-	700	183,975	29,462	213,437	13 00
Washington,	-	-	-	800	197,473	17,983	215,456	14 00
West Stockbridge,	-	1,050	200	1,250	351,162	79,702	430,864	15 70
Williamstown,	3,000	3,000	700	6,700	2,415,080	373,066	2,788,146	16 25
Windsor,	-	-	-	1,000	152,310	29,916	182,226	20 80
Total,	\$14,150	\$28,850	\$7,500	\$84,500	\$21,524,632	\$7,363,824	\$28,888,456	-
Average,	-	-	-	2,817	717,488	245,461	962,949	\$15 44

¹ Town has obtained loan of \$33,255 for construction of new roads. ² Includes appropriation for bridges. ³ \$5,000 appropriated for extension of State highway.

⁴ Includes \$2,000 for sidewalks. ⁵ Includes \$300 for care of snow. ⁶ Includes \$150 for breaking out roads.

BRISTOL COUNTY.

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
Acushnet,	\$7,000	\$300	—	\$7,300	\$634,060	\$119,020	\$753,080	\$14 00
Attleborough,	—	—	—	10,000	4,573,760	1,091,140	5,664,900	18 50
Berkley,	—	—	—	1,200	323,370	64,849	388,219	11 00
Dartmouth,	125	3,500	\$150	3,650	2,106,800	306,000	2,412,800	14 40
Dighton,	—	—	—	3,250	704,697	82,711	787,408	15 00
Easton,	—	6,400	—	6,400	1,781,369	2,174,436	3,955,805	9 30
Fairhaven,	—	—	—	3,000	1,929,619	294,118	2,223,737	15 20
Freetown,	—	—	—	2,000	661,212	150,937	812,149	9 00
Mansfield,	—	3,550	1,000	4,550	1,616,416	230,164	1,846,580	19 50
North Attleborough,	—	—	—	5,000	3,103,295	736,903	3,840,198	23 00
Norton,	—	—	—	2,600	676,325	113,075	789,400	13 20
Rayham,	—	3,000	200	3,200	660,860	93,956	754,816	14 00
Rehoboth,	—	—	—	3,000	620,000	86,340	706,340	15 30
Seekonk,	—	—	—	3,300	703,405	219,810	923,215	11 00
Somerset,	—	2,700	—	2,700	909,578	129,862	1,039,440	15 50
Swansey,	—	—	—	3,000	668,055	195,677	863,732	16 60
Westport,	1,500	10,450	—	11,950	1,325,800	211,150	1,536,950	16 80
Total,	\$8,625	\$29,940	\$1,350	\$76,100	\$22,998,621	\$6,300,148	\$29,298,769	—
Average,	—	—	—	4,476	1,352,860	370,597	1,723,457	\$14 78

DUKES COUNTY.

Chilmark,	—	\$450	—	\$450	\$191,247	\$26,417	\$217,664	\$8 20
Cottage City,	—	1,600	—	1,600	1,550,250	99,800	1,660,050	15 80
Edgartown,	\$3,000	500	—	3,500	576,378	129,638	706,016	16 00
Gay Head,	—	75	—	75	20,014	5,607	25,621	10 00
Gosnold,	—	—	—	—	207,863	16,285	224,148	4 54
Tisbury,	—	—	—	1,500	838,984	88,585	927,569	11 60
West Tisbury,	—	400	—	400	335,220	50,047	385,267	6 00
Total,	\$3,000	\$3,025	—	\$7,525	\$3,729,956	\$416,379	\$4,146,335	—
Average,	—	—	—	1,075	532,850	59,483	592,333	\$10 30

NANTUCKET COUNTY.

Nantucket,	—	\$1,500	—	\$1,500	\$1,968,761	\$1,006,898	\$2,975,659	\$10 00
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SUFFOLK COUNTY.

Revere,	\$2,050	\$13,000	—	\$15,050	\$9,113,000	\$250,000	\$9,363,000	\$14 00
Winthrop,	2,500	121,800	\$1,000	25,300	5,899,950	154,640	6,054,590	15 30
Total,	\$4,550	\$34,800	\$1,000	\$40,350	\$15,012,950	\$404,640	\$15,417,590	—
Average,	2,275	17,400	—	20,175	7,506,475	202,320	7,708,795	\$14 65

¹ Includes appropriation for sidewalks.

ESSEX COUNTY.

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate	Total.	Tax Rate.
Amesbury,	—	—	—	\$10,000	\$4,094,028	\$1,025,233	\$5,119,261	\$14 60
Andover,	\$4,000	\$3,400	—	7,400	3,614,029	1,123,582	4,727,611	15 00
Boxford,	—	—	—	1,220	548,982	328,360	877,342	7 60
Danvers,	500	7,500	—	8,000	3,097,625	1,264,540	4,962,165	18 00
Essex,	525	12,315	—	2,840	785,834	217,713	1,003,547	14 80
Georgetown,	—	11,425	—	1,425	804,520	216,490	1,021,010	16 00
Groveland,	275	2,000	\$300	2,575	794,106	175,321	969,427	20 80
Hamilton,	—	2,000	—	2,000	1,028,810	755,160	1,783,970	6 00
Ipswich,	—	8,000	100	8,100	2,294,021	758,504	3,052,525	15 00
Lynnfield,	—	11,300	100	1,400	575,285	78,998	654,283	12 50
Manchester,	3,000	10,000	—	13,000	3,739,090	3,524,803	7,263,893	8 20
Marblehead,	—	8,000	—	8,000	4,793,650	761,775	5,555,425	16 80
Merrimac,	—	12,000	—	2,000	980,250	340,248	1,320,498	17 00
Methuen,	—	11,000	4,500	16,920	3,039,415	913,422	3,952,837	16 80
Middleton,	1,420	1,000	150	1,150	487,334	54,248	541,582	19 50
Nahant,	—	12,900	—	12,900	2,491,538	2,380,483	4,872,021	7 50
Newbury,	—	—	—	2,500	836,790	174,819	1,011,609	10 00
North Andover,	—	18,900	—	8,900	2,338,267	583,443	2,926,710	15 00
Peabody,	400	12,000	—	12,400	5,556,750	2,087,800	7,644,550	16 00
Rockport,	—	3,500	—	3,500	2,409,356	332,100	2,741,456	13 00
Rowley,	—	1,790	—	1,790	560,764	94,572	655,336	13 75
Salisbury,	—	2,200	—	2,200	590,605	50,425	641,030	12 00
Saugus,	—	27,700	—	7,700	3,171,363	177,883	3,349,246	18 00
Swampscott,	—	5,500	—	5,500	3,756,900	1,441,947	5,201,847	12 00
Topsheld,	—	1,500	250	1,750	501,445	283,815	785,260	14 00

Wenham,	1,500	—	1,500	662,525	134,500	797,025	9 60
West Newbury,	1,500	400	1,900	774,950	91,900	866,850	14 00
Total,	\$118,930	\$5,800	\$148,570	\$54,918,232	\$19,380,084	\$74,298,316	—
Average,	—	—	5,503	2,034,008	717,781	2,751,789	\$13 83

FRANKLIN COUNTY.

Ashfield,	\$110	\$2,000	—	\$2,110	\$416,122	\$91,066	\$507,188	\$15 50
Barnardston,	—	800	—	800	326,223	69,351	395,574	12 50
Buckland,	—	—	—	2,000	97,523	466,001	563,524	20 00
Charlton,	600	1,200	\$500	2,300	281,073	72,226	353,299	22 00
Colrain,	—	—	—	3,000	410,502	165,887	576,389	16 00
Conway,	300	1,800	970	3,070	506,425	167,920	674,345	17 00
Deerfield,	—	—	—	2,300	1,166,401	116,939	1,283,340	11 00
Erving,	—	1,000	1,000	2,000	333,055	90,668	423,723	19 00
Gill,	—	1,000	—	1,000	400,718	80,088	480,806	11 00
Greenfield,	3,000	11,000	—	14,000	4,506,963	1,213,085	5,720,048	15 00
Hawley,	900	1,000	400	2,300	115,781	27,411	143,192	27 00
Heath,	500	800	—	1,300	122,910	28,978	151,888	19 00
Leverett,	—	600	—	1,000	222,810	53,180	275,990	14 50
Leyden,	875	—	300	1,775	132,218	161,694	293,912	12 00
Monroe,	—	—	—	600	90,266	48,552	138,818	14 30
Montague,	—	—	—	20,500	2,933,956	797,830	3,731,786	4 17 00
New Salem,	—	—	—	1,000	232,000	41,000	273,000	21 00
Northfield,	275	2,000	—	2,275	815,939	92,979	908,918	12 50
Orange,	500	6,000	—	6,500	2,336,615	508,895	2,845,510	20 00

¹ Includes appropriation for sidewalks.² Includes \$400 appropriation for sidewalks.³ New bridge, \$4,500; abolition of grade crossing, \$2,000.⁴ \$1.90 additional in fire district.⁵ \$1,000 appropriated for breaking out roads.

FRANKLIN COUNTY — *Concluded.*

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
Rowe,	—	\$1,000	—	\$1,000	\$145,125	\$25,657	\$170,782	\$18 50
Shelburne,	—	—	—	2,000	693,375	192,493	885,868	17 00
Shutesbury,	—	600	—	600	138,750	23,719	162,469	20 00
Sunderland,	—	—	—	600	372,670	52,194	424,864	12 00
Warwick,	—	—	—	1,500	249,390	84,535	333,925	13 50
Wendell,	—	—	—	1,200	142,785	91,700	234,485	20 00
Whately,	—	1,000	\$500	1,500	332,954	79,199	412,153	15 25
Total,	\$7,060	\$31,800	\$3,670	\$79,230	\$17,522,549	\$4,843,247	\$22,365,796	—
Average,	—	—	—	3,048	673,944	186,279	860,223	\$16 64

HAMPDEN COUNTY.

Agawam,	—	\$2,500	\$400	\$2,900	\$1,154,755	\$167,467	\$1,322,222	\$17 00
Blandford,	—	2,150	300	2,450	353,070	86,620	439,690	18 00
Brimfield,	\$900	1,500	300	2,700	346,158	51,246	397,404	17 25
Chester,	—	2,000	500	2,500	492,905	84,295	577,200	20 00
Granville,	—	—	—	2,400	272,700	82,271	354,971	24 00
Hampden,	—	—	—	800	339,820	52,075	391,895	11 50
Holland,	—	400	50	450	80,895	5,922	86,817	11 00
East Longmeadow,	—	2,000	—	2,000	531,470	91,685	623,155	15 25
Longmeadow,	—	850	—	850	555,020	65,450	620,470	8 20
Ludlow,	—	3,500	8,000	11,500	914,254	365,241	1,279,495	11 40

Monson,	—	4,000	—	4,000	1,226,870	500,891	1,727,761	17 00
Montgomery,	—	500	—	500	117,055	22,442	139,497	13 50
Palmer,	4,500	5,000	—	11,200	1,925,939	793,699	2,719,638	18 90
Russell,	—	1,000	1,700	1,000	336,158	143,418	479,576	11 00
Southwick,	—	1,300	—	1,500	435,925	52,805	488,730	16 00
Tolland,	—	900	—	900	116,575	24,303	140,878	20 00
Wales,	—	1,700	—	700	210,011	61,681	271,692	13 50
West Springfield,	—	7,100	—	7,100	4,121,221	446,308	4,567,529	15 50
Westfield,	² 5,000	8,800	2,000	15,800	6,221,456	1,829,083	8,050,539	16 00
Wilbraham,	—	—	—	1,900	612,609	140,649	753,258	12 80
Total,	\$10,400	\$44,200	\$13,450	\$73,150	\$20,364,866	\$5,067,551	\$25,432,417	—
Average,	—	—	—	3,658	1,018,243	253,378	1,271,621	\$15 39

HAMPSHIRE COUNTY.

Amherst,	—	\$4,656	\$1,150	\$5,806	\$2,487,555	\$619,835	\$3,107,390	\$15 50
Belcherfown,	—	—	—	2,500	733,670	134,940	868,610	14 70
Chesterfield,	—	—	—	³ 1,200	230,131	47,643	277,774	16 50
Cummington,	—	—	—	⁴ 1,200	233,505	49,749	283,254	19 30
Easthampton,	—	—	⁵ 3,600	6,100	2,226,500	623,182	2,849,682	16 50
Enfield,	—	⁶ 1,200	900	2,100	388,116	195,010	583,126	9 50
Goshen,	—	900	—	900	116,315	20,277	136,592	18 00
Granby,	—	1,000	500	1,500	371,981	60,225	432,206	13 70
Greenwich,	—	400	⁷ 1,200	1,600	181,585	68,280	249,865	14 00
Hadley,	—	—	—	1,500	856,830	97,382	954,212	16 50
Hatfield,	—	—	—	1,500	776,459	193,206	969,665	12 30

¹ Includes appropriation for bridges.² Macadam.³ \$300 for winter use.⁴ \$200 for winter use.⁵ \$3,300 for bridge and abutments at Manhan River.⁶ Includes appropriation for sidewalks.⁷ \$1,000 for new bridge work.

HAMPSHIRE COUNTY — *Concluded.*

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
Huntington,	—	—	—	\$1,700	\$387,340	\$109,537	\$496,877	\$21 00
Middlefield,	—	—	—	800	143,980	53,511	197,491	13 00
Pelham,	—	\$900	—	900	158,369	17,616	175,985	17 50
Plainfield,	—	600	—	1 900	123,021	31,967	157,988	15 00
Prescott,	—	—	—	700	139,920	21,582	161,502	14 10
South Hadley,	—	1,800	\$700	2,500	1,803,820	268,477	2,072,297	2 18 50
Southampton,	—	1,200	—	1,200	421,669	63,811	485,480	13 00
Ware,	\$11,500	5,000	—	16,500	3,072,195	1,052,330	4,124,525	16 80
Westhampton,	—	—	—	800	180,679	35,780	216,459	14 50
Williamshurg,	—	1,200	—	1,200	687,651	165,745	853,396	12 50
Worthington,	—	1,400	400	1,800	230,270	82,958	313,228	17 50
Total,	\$1,500	\$22,756	\$8,450	\$54,906	\$15,951,561	\$4,016,043	\$19,967,604	—
Average,	—	—	—	2,496	725,071	182,547	907,618	\$15 45

MIDDLESEX COUNTY.

Acton,	—	—	—	\$3,000	\$1,305,040	\$230,945	\$1,535,985	\$11 50
Arlington,	—	—	—	26,550	6,949,890	1,124,203	8,074,093	18 30
Ashby,	—	\$1,500	—	1,500	362,660	107,089	469,749	15 00
Ashland,	—	—	—	1,500	1,062,387	108,469	1,170,856	17 10
Ayer,	—	—	—	3 000	1,131,887	238,949	1,369,936	16 40
Bedford,	\$2,000	\$2,500	\$100	4,600	910,682	93,507	1,004,189	16 00

Belmont,	.	.	.	.	.	15,000	3,236,065	991,730	4,217,795	16 25
BillERICA,	.	.	.	.	200	8,710	1,497,376	330,844	1,828,220	10 30
Boxborough,	.	.	.	.	-	750	195,245	32,772	228,017	12 00
Burlington,	.	.	.	.	-	1,500	437,230	70,288	507,518	16 00
Carlisle,	.	.	.	.	-	1,000	306,473	41,830	348,303	16 67
Chelmsford,	.	.	.	.	-	6,800	1,952,640	310,670	2,263,310	11 00
Concord,	.	.	.	.	-	8,500	2,808,500	1,054,272	3,862,772	14 00
Danvers,	.	.	.	.	-	5,450	1,657,285	369,990	2,027,275	10 50
Dunstable,	.	.	.	.	-	600	243,717	42,510	286,227	13 50
Framingham,	.	.	.	.	5,868	16,118	6,665,350	1,333,856	7,999,206	18 00
Groton,	.	.	.	.	-	5,000	1,460,895	1,240,758	2,701,653	7 00
Holliston,	.	.	.	.	-	2,500	1,536,160	247,765	1,783,925	21 00
Hopkinton,	.	.	.	.	-	4,000	1,483,695	334,855	1,818,550	18 50
Hudson,	.	.	.	.	-	7,100	2,456,810	451,940	2,908,750	19 75
Lexington,	.	.	.	.	-	10,200	4,085,619	480,098	4,565,717	15 00
Lincoln,	.	.	.	.	-	4,600	823,823	1,041,454	1,865,277	12 50
Littleton,	.	.	.	.	-	1,500	691,365	179,751	871,116	13 33½
Maynard,	.	.	.	.	-	4,500	1,520,436	652,104	2,172,540	13 00
Melrose,	.	.	.	.	-	20,000	11,450,600	758,215	12,208,815	15 60
Natick,	.	.	.	.	-	12,500	4,748,350	950,000	5,698,350	19 60
North Reading,	.	.	.	.	-	1,300	450,483	63,044	513,527	14 30
Pepperell,	.	.	.	.	300	54,100	1,608,934	479,330	2,088,268	12 00
Reading,	.	.	.	.	-	8,475	3,586,240	554,031	4,140,271	18 00
Sherborn,	.	.	.	.	150	8,1850	719,115	66,655	785,770	12 80
Shirley,	.	.	.	.	75	1,075	598,455	142,134	740,589	13 80
Stoneham,	.	.	.	.	-	9,000	4,456,350	438,110	4,894,460	17 60
Stow,	.	.	.	.	-	1,500	545,178	132,855	678,033	8 00
Sudbury,	.	.	.	.	-	8,660	916,070	188,720	1,104,790	13 00
Tewksbury,	.	.	.	.	-	4,500	1,390,598	221,058	1,611,656	13 00

¹ \$300 for winter use.

² Fire district pays \$3.25 per \$1,000 extra.

³ Includes appropriation for sidewalks.

⁴ \$1,350 for sidewalks and care of snow.

⁵ \$1,100 appropriated for sidewalks and care of snow.

⁶ \$200 for removing snow.

⁷ \$5,000 for roads in metropolitan park.

⁸ Includes \$1,160 for special road repairs ordered by county commissioners.

MIDDLESEX COUNTY — Concluded.

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
Townsend,	—	—	—	\$2,000	\$921,000	\$192,000	\$1,113,000	\$15 50
Tyngsborough,	—	—	—	1,000	342,571	44,629	387,200	16 60
Wakefield,	\$4,000	\$8,750	—	12,750	6,227,375	1,004,330	7,231,705	17 40
Watertown,	40,000	14,000	—	54,000	8,184,100	1,610,958	9,795,058	15 20
Wayland,	—	3,225	—	3,225	1,226,580	265,375	1,491,955	16 00
Westford,	1,500	3,000	—	4,500	1,040,190	219,364	1,259,554	13 50
Weston,	500	6,000	—	8,000	1,231,081	1,964,850	3,195,931	8 30
Wilmington,	—	2,000	—	2,000	933,863	101,327	1,035,190	13 25
Winchester,	—	—	—	20,000	6,428,145	854,290	7,282,435	15 40
Total,	\$62,775	\$136,825	\$6,693	\$319,403	\$101,776,512	\$21,361,024	\$123,137,536	—
Average,	—	—	—	7,259	2,313,102	485,478	2,798,580	14 58

NORFOLK COUNTY.

Avon,	\$200	\$1,000	—	\$1,200	—	—	\$805,110	\$19 60
Bellingham,	—	1,500	\$100	1,600	\$608,785	\$133,550	742,335	14 50
Braintree,	—	—	—	8,500	3,736,125	717,700	4,453,825	18 80
Brookline,	—	60,000	\$87,000	147,000	47,499,100	16,636,100	64,135,200	12 20
Canton,	—	—	—	11,000	2,608,960	1,319,380	3,928,340	16 80
Cohasset,	—	8,200	1,000	9,200	2,709,846	2,069,490	4,779,336	9 00
Dedham,	—	—	—	10,600	6,829,080	1,177,198	8,006,278	14 10
Dover,	—	3,100	—	3,100	481,568	338,964	820,532	8 40

Foxborough,	.	.	.	.	1,400	—	4,400	1,618,255	341,232	1,959,487	16 30
Franklin,	.	.	.	.	15,500	—	5,500	2,406,685	508,755	2,915,440	14 80
Holbrook,	.	.	.	.	1,200	—	1,200	1,037,280	149,430	1,206,710	23 25
Hyde Park,	.	.	.	.	15,000	—	23,100	8,337,950	990,285	9,328,235	15 50
Medfield,	.	.	.	.	2,000	100	2,100	1,034,325	280,801	1,315,126	12 00
Medway,	.	.	.	.	2,500	300	3,100	1,232,950	178,485	1,411,435	16 50
Millis,	.	.	.	.	1,200	—	1,200	655,965	63,880	719,845	13 50
Milton,	.	.	.	.	35,600	500	36,100	8,207,800	10,818,300	19,086,100	9 00
Needham,	.	.	.	.	18,500	—	10,500	2,822,679	370,907	3,193,586	15 80
Norfolk,	.	.	.	.	1,500	—	1,500	461,369	58,968	520,337	15 20
Norwood,	.	.	.	.	11,150	—	11,700	2,940,985	745,190	3,686,175	18 40
Randolph,	.	.	.	.	5,000	—	5,000	1,616,550	265,750	1,882,300	21 00
Sharon,	.	.	.	.	4,800	—	5,750	1,600,401	192,189	1,792,590	12 70
Stoughton,	.	.	.	.	—	—	5,000	2,559,135	373,088	2,932,223	18 00
Walpole,	.	.	.	.	—	—	4,000	1,926,288	462,750	2,389,038	18 50
Wellesley,	.	.	.	.	—	—	6,500	4,801,925	2,597,875	7,399,800	11 00
Weymouth,	.	.	.	.	20,000	1,000	21,950	5,384,450	1,271,039	6,655,489	20 30
Wrentham,	.	.	.	.	—	—	3,000	1,232,163	192,442	1,424,605	16 00
Total,	.	.	.	.	\$13,550	\$89,500	\$343,800	\$114,480,619	\$42,253,748	\$157,539,477	—
Average,	.	.	.	.	—	—	13,223	4,579,225	1,690,150	6,059,211	\$15 43

PLYMOUTH COUNTY.

Abington,	.	.	.	.	\$3,000	\$100	\$3,100	\$1,947,100	\$303,318	\$2,250,418	\$21 60
Bridgewater,	.	.	.	.	—	—	4,000	2,004,641	282,565	2,287,206	16 50
Carver,	.	.	.	.	1,500	50	1,550	660,695	164,610	825,305	10 10
Duxbury,	.	.	.	.	6,500	1,000	8,000	1,313,417	251,741	1,565,158	15 60

¹ Includes appropriation for sidewalks.⁴ Average of 25 towns.² \$500 each for snow, sidewalks and special appropriation.⁵ Average of 26 towns.³ New bridge over Muddy River.

PLYMOUTH COUNTY — Concluded.

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
East Bridgewater,	—	\$3,400	\$500	\$3,900	\$1,178,326	\$243,020	\$1,421,346	\$16 50
Halifax,	—	—	—	800	243,570	25,639	269,209	12 70
Hanover,	—	3,000	200	3,200	880,710	332,240	1,212,950	15 00
Hanson,	—	12,300	100	12,400	536,775	131,422	668,197	15 50
Hingham,	\$1,350	8,800	—	10,150	3,036,475	987,141	4,023,616	19 10
Hull,	750	5,500	—	6,250	3,763,139	111,076	3,874,215	17 90
Kingston,	—	—	—	3,500	898,530	500,160	1,398,690	11 00
Lakeville,	—	2,000	—	2,000	449,509	36,880	486,389	11 50
Marion,	350	2,400	—	2,750	785,570	145,230	930,800	13 00
Marshfield,	1,050	4,100	—	5,150	1,188,385	147,515	1,335,900	17 50
Mattapoisett,	1,700	2,180	—	3,780	930,787	557,220	1,488,007	7 00
Middleborough,	—	—	—	15,000	3,323,270	488,685	3,811,955	18 75
Norwell,	—	2,500	—	2,500	688,135	176,390	864,525	14 00
Pembroke,	—	1,500	100	1,600	575,645	63,580	639,225	17 20
Plymouth,	3,000	14,000	—	17,000	4,972,875	1,921,025	6,893,900	16 40
Plympton,	—	900	—	900	275,991	41,021	317,012	12 60
Rochester,	7,000	1,200	—	8,200	418,469	73,621	492,090	15 00
Rockland,	300	4,550	—	4,850	2,478,982	510,908	2,989,890	22 20
Scituate,	2,500	4,600	—	7,100	2,237,695	183,510	2,421,205	11 50
Wareham,	—	5,000	400	5,400	1,633,150	488,368	2,121,518	15 50
West Bridgewater,	—	3,500	—	3,500	863,901	147,140	1,011,041	13 00
Whitman,	3,050	1,000	4,900	8,950	3,093,481	562,863	3,656,344	18 00
Total,	\$21,550	\$83,330	\$7,350	\$135,530	\$40,379,223	\$8,876,888	\$49,256,111	—
Average,	—	—	—	5,558	1,553,047	341,419	1,894,466	\$15 18

WORCESTER COUNTY.

[illegible]¹ Includes appropriation for sidewalks.

a Includes appropriation for bridges.

³ Includes \$300 for fencing.

WORCESTER COUNTY — *Concluded.*

TOWNS.	APPROPRIATIONS.				VALUATIONS.			
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.
Millbury,	\$100	\$2,500	\$100	\$3,150	\$1,728,094	\$534,860	\$2,262,954	\$19 50
New Brantree,	—	1,000	—	1,000	339,870	70,034	409,904	11 50
Northborough,	—	1,800	—	1,800	977,540	243,178	1,220,718	13 20
Northbridge,	—	1,000	—	3,500	1,665,040	1,499,331	3,164,371	13 40
North Brookfield,	—	3,000	—	3,000	1,594,165	228,380	1,822,545	22 50
Oakham,	—	—	—	1,000 ⁴	269,823	42,900	312,723	11 20
Oxford,	—	—	—	2,000	984,490	280,786	1,265,276	17 30
Paxton,	—	—	—	500	252,006	37,523	289,529	14 00
Petersham,	—	—	—	2,000	523,285	119,915	643,200	12 00
Phillipston,	—	900	—	900	224,295	26,353	250,648	18 30
Princeton,	—	—	—	3,300	713,909	135,514	849,423	11 00
Royalston,	—	—	—	2,000	402,080	72,855	474,935	12 00
Rutland,	—	—	—	1,200	503,127	62,007	565,134	15 00
Shrewsbury,	—	1,800	—	1,800	903,432	125,297	1,028,729	13 70
Southborough,	2,000	2,500	—	4,500	1,146,398	342,000	1,488,398	10 20
Southbridge,	—	7,500	400	7,900	2,764,434	52,390	2,816,824	15 40
Spencer,	—	—	—	² 8,000	2,769,320	881,640	3,650,960	20 00
Sterling,	—	—	—	2,500	767,030	99,990	867,020	13 60
Sturbridge,	—	2,500	900	3,400	705,915	211,687	917,602	16 50
Sutton,	—	—	—	3,000	913,560	358,522	1,272,082	13 20
Templeton,	—	2,650	500	3,150	1,058,116	212,055	1,270,171	17 60
Uxbridge,	—	4,000	³ 1,850	5,850	1,603,050	594,560	2,197,610	15 40
Upton,	4,000	2,200	—	6,200	795,174	218,641	1,013,815	16 00
Warren,	110	2,000	⁴ 6,500	8,610	1,924,325	515,417	2,439,742	14 50
Webster,	20,000	3,000	150	23,150	2,221,140	1,051,031	3,272,171	12 50

Westborough, . . . . .	.	.	.	.	.	4,000	2,364,945	485,858	2,850,803	16 40
West Boylston,	—	—	—	—	—	2,000	1,226,052	145,408	1,371,460	17 00
West Brookfield,	—	—	—	—	—	1,910	666,926	96,500	763,426	16 00
Westminster,	—	—	—	—	—	2,000	574,310	76,329	650,639	14 50
Winchendon,	500	4,000	450	—	—	4,950	1,750,117	658,797	2,408,914	21 00
Total,	\$37,085	\$106,552	\$12,840	\$248,837	\$75,736,747	\$23,244,826	\$98,981,573	—	—	—
Average,	—	—	—	4,365	1,328,715	407,804	1,736,519	\$14 95		

¹ Includes \$450 for sidewalks.² Includes \$2,000 for sidewalks.³ Includes new stone arch bridge, \$1,350.⁴ New work; abolition of grade crossings.⁵ Includes \$710 for sidewalks.

SUMMARY BY COUNTIES OF VALUATION OF TOWNS, AND APPROPRIATIONS FOR CONSTRUCTION AND REPAIRS OF ROADS AND BRIDGES.

COUNTIES.	No. of Towns.	APPROPRIATIONS.				Average Appropriation.	VALUATIONS.			Average Tax Rate.	Amount per \$1,000 of Valuation expended annually on Roads and Bridges.
		New Roads.	Repairs.	Bridges.	Total.		Real Estate.	Personal Estate.	Total.		
Barnstable, . .	15	\$35,265	\$46,080	\$6,750	\$95,795	\$6,386	\$13,690,488	\$8,585,853	\$22,276,341	\$13 05	\$4 30
Berkshire, . .	30	14,150	28,850	7,500	81,500	2,817	21,524,632	7,363,824	28,888,456	15 44	2 93
Bristol, . . .	17	8,625	29,900	1,350	76,100	4,476	22,998,621	6,300,148	29,298,769	14 78	2 60
Dukes, . . .	7	3,000	3,025	—	7,525	1,075	3,729,956	416,379	4,146,335	10 30	1 81
Essex, . . .	27	10,120	118,930	5,800	148,570	5,503	54,918,232	19,380,084	74,298,316	13 83	2 00
Franklin, . .	26	7,060	31,800	3,670	79,320	3,048	17,522,549	4,843,247	22,365,796	16 64	3 55
Hampden, . .	20	10,400	44,200	13,450	73,150	3,658	20,364,866	5,067,551	25,432,417	15 39	2 88
Hampshire, .	22	1,500	22,756	8,450	54,906	2,496	15,951,561	4,016,043	19,967,604	15 45	2 75
Middlesex, .	44	62,775	136,825	6,693	319,403	7,259	101,776,512	21,361,024	123,137,536	14 58	2 59
Nantucket, .	1	—	1,500	—	1,500	1,500	1,968,761	1,006,898	2,975,659	10 00	50
Norfolk, . .	26	13,550	192,150	89,500	343,800	13,223	114,480,619	42,253,748	157,539,477	15 43	2 18
Plymouth, .	26	21,550	83,330	7,350	134,530	5,174	40,379,223	8,876,888	49,256,111	15 18	2 73
Suffolk, . .	2	4,550	34,800	1,000	40,350	20,175	15,012,950	404,640	15,417,590	14 65	2 62
Worcester, .	57	37,085	106,552	12,840	248,837	4,365	75,736,747	23,244,826	98,981,573	14 95	2 51
Totals, . .	320	\$229,630	\$880,698	\$164,353	\$1,708,286	\$5,797	\$520,055,717	\$153,121,153	\$673,981,980	\$14 26	\$2 54

¹ Valuation (\$805,110) not divided in one town.² Average.

CITIES.

CITIES.	APPROPRIATIONS.			VALUATIONS.			Amount per \$1,000 of Total Valuation expended Yearly on Roads and Bridges.
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Tax Rate.
Beverly, . .	—	\$35,000	\$2,000	\$37,000	\$11,211,075	\$3,066,725	\$16 00
Boston, . .	¹ \$92,500	² 2,593,300	³ 167,000	⁴ 4,373,560	803,860,550	208,696,706	11 27
Brockton, .	—	—	—	57,000	22,639,616	2,981,756	20 70
Cambridge, .	185,335	160,000	22,000	367,335	70,339,200	16,302,345	17 50
Chelsea, . .	⁵ 10,000	20,500	—	30,500	20,734,600	2,297,752	1 32
Chicopee, . .	—	10,000	—	10,000	6,747,430	2,452,040	17 20
Everett, . .	—	17,500	—	⁶ 18,500	14,262,900	665,100	1 24
Fall River, .	—	—	—	152,000	43,363,900	27,928,464	18 70
Fitchburg, .	1,000	30,000	—	31,000	16,603,260	4,652,016	17 20
Gloucester, .	8,200	⁷ 30,400	1,000	39,600	12,182,440	3,381,378	1 46
Haverhill, .	—	40,000	2,000	42,000	19,804,497	5,137,599	2 54
Holyoke, . .	—	24,500	—	24,500	25,057,810	7,929,015	1 68
Lawrence, . .	—	65,000	2,500	67,500	27,882,800	8,325,366	74
Lowell, . . .	—	—	—	114,500	54,678,720	15,707,450	1 86
Lynn,	⁸ 25,000	55,000	—	80,000	41,157,046	9,724,857	1 63
Malden, . . .	10,000	52,000	—	62,000	22,426,000	2,959,520	1 77
Marlborough, .	—	—	—	17,000	7,741,019	1,231,366	2 44
Medford, . . .	—	46,000	1,100	47,100	16,166,050	2,182,450	18 10
New Bedford, .	—	147,000	4,400	151,400	35,595,800	22,575,978	17 00
							16 20

¹ Regular appropriation; \$84,797.52 additional expended to Dec. 1, 1897, on special loans and appropriations.² Regular appropriation; \$1,027,203.75 additional expended to Dec. 1, 1897, on special loans and appropriations.³ Regular appropriation; \$319,666.12 additional expended to Dec. 1, 1897, on special loans and appropriations.⁴ Includes expenditures on special loans and appropriations and \$89,092.98 additional expended to Dec. 1, 1897, for abolition of grade crossings.⁵ Permanent improvements.⁶ Includes \$1,000 for sidewalks.⁷ Includes appropriation for sidewalks.⁸ Includes \$10,000 for sidewalks.

CITIES — *Concluded.*

CITIES.	APPROPRIATIONS.				VALUATIONS.				Amount per \$1,000 of Total Valuation expended Yearly on Roads and Bridges.
	New Roads.	Repairs.	Bridges.	Total.	Real Estate.	Personal Estate.	Total.	Tax Rate.	
Newburyport, .	\$8,000	\$8,400	\$3,500	\$19,900	\$7,166,200	\$2,497,874	\$9,664,074	\$15 40	\$2 06
Newton, .	8,600	80,000	—	1 148,400	41 550,350	10,471,650	52,022,000	16 20	2 85
North Adams, .	—	12,500	2 17,000	29,500	6,835,425	1,708,987	8,544,412	24 00	3 45
Northampton, .	—	—	—	20,000	9,098,180	2,303,088	11,401,268	15 00	1 75
Pittsfield, .	2,800	25,850	2,500	31,150	11,258,795	3,320,867	14,579,662	16 80	2 14
Quincy, .	4,600	17,000	2,300	23,900	15,557,500	2,454,646	18,012,146	18 80	1 33
Salem, .	—	23,000	3,600	26,600	18,166,200	10,805,000	28,971,200	17 30	92
Somerville, .	—	—	—	3 63,000	46,306,400	3,867,375	50,173,775	17 30	1 26
Springfield, .	65,000	60,000	12,000	137,000	50,344,460	13,289,200	63,633,660	13 00	2 15
Taunton, .	61,400	25,800	—	87,200	14,630,650	5,653,130	20,283,780	16 80	4 30
Waltham, .	—	—	—	25,000	14,190,000	4,598,314	18,788,314	17 50	1 33
Woburn, .	600	14,400	—	15,000	8,261,628	1,557,648	9,819,276	18 90	1 53
Worcester, .	167,342	172,000	62,658	402,000	78,501,750	19,981,841	98,483,591	14 80	4 08
Totals, .	\$650,377	\$3,765,150	\$305,558	\$6,761,145	\$1,594,342,251	\$430,707,703	\$2,025,049,954	—	—
Average, .	—	—	—	211,286	—	—	—	\$17 06	\$3 34

¹ Includes appropriation for sidewalks, street watering, etc.² Includes \$15,000 for new bridges.³ Includes \$10,000 for sidewalks.

APPENDIX K.

COPY OF A LETTER SENT THE GOVERNOR AND COUNCIL CONCERNING THE WORCESTER COUNTY ALLOTMENTS.

COMMONWEALTH OF MASSACHUSETTS.

OFFICE OF MASSACHUSETTS HIGHWAY COMMISSION,
4 MOUNT VERNON STREET, BOSTON, June 1, 1897.To His Excellency ROGER WOLCOTT, *Governor of Massachusetts.*

SIR:—The Massachusetts Highway Commission begs to acknowledge the receipt of a letter from the Executive Clerk, dated Thursday, May 27, informing the Commission that its request for permission to construct more than ten miles of State road in Worcester County during the current year, made in accordance with the provisions of section 4, chapter 497, Acts of 1894, was not granted.

The effect of this decision is so far reaching, necessitating, as it does, a radical departure from the principles upon which the construction of State roads has been from the beginning of the work fairly apportioned among the several counties of the State, which principles were determined upon by the Commissioners after a careful study of all possible methods of distribution, that we are compelled to believe that in the oral explanation of our request before the Finance Committee of the Council, we failed to make a clear presentation of the reasons for making it.

We desire, therefore, to ask the attention of Your Excellency and the Council to a statement of these reasons, and we respectfully request a reconsideration of the decision which has been communicated to us.

That part of the statute referring to the question of the distribution of State highways is as follows:—

“All construction of State roads shall be fairly apportioned by said Commission among the different counties, and not more than ten miles of State road shall be constructed in any one county in any one year on petition as aforesaid without the previous approval thereof, in writing, by the Governor and Council.” (Section 4, chapter 497, Acts of 1894.)

It will be noted that the meaning of the phrase “fairly apportioned” is nowhere defined in the statute, and that it therefore devolves upon the Highway Commission to determine what shall

constitute a fair apportionment. A single limitation, however, is placed upon the Commission, in the provision that more than ten miles of State road shall not be constructed in any one county in any one year without previous consent of the Governor and Council.

We will first consider the interpretation of the words "fairly apportioned" as accepted by the Commission.

A distribution among the several counties of the fund appropriated by the Legislature might be made upon any one of a number of considerations, the principal of which are the following:—

Assessed valuation.

Population.

Miles of existing road per 1,000 of population.

Population per mile of existing road.

Area.

Miles of existing road.

All of these were considered by the Commission at the beginning of its work, and in their report for the year 1893 will be found tables showing statistics relative to the above, by which their value as a coefficient of distribution may be readily determined.

If, for example, the principle of assessed valuation be applied, it will be found that Suffolk County, in which there are but 53 miles of highway aside from city streets, and only 533 miles in all (about 2.5 per cent. of the whole), would necessarily receive nearly 40 per cent. of the appropriation; and had this been allowed from the start, every mile of her roads would now be built and accepted as State highways, while such counties as Franklin and Hampshire would have had, at the end of three years, a trifle over one mile each, with about 1,000 feet in Dukes and Nantucket. Surely such a distribution could hardly have been approved by any considerable number of people.

If population be accepted as a basis of apportionment it will at once be seen that it is not much more nearly just than that of assessed valuation. Density of population and concentration of wealth will be found, in general, in the same areas, and neither has any logical or constant relation to the extent and cost of a system of public highways.

The number of existing miles of road per 1,000 of population has been suggested as a rational basis of distribution, on the principle that it may be an index of the extent to which highways are a necessity to the people. According to this rule by far the larger share of the money appropriated would be expended in Dukes County, Franklin, Barnstable and Nantucket following closely. To Essex County would be allotted for the current year \$10,600 instead of \$46,500, as has been done under the system in use, and for Middlesex County there would be \$13,000 as against \$74,350.

Even more absurd would be the inverse of this proposition, which has also been suggested, viz., a division in proportion to the population per mile of existing roadway. Nantucket, with only 114 miles of roadway in all, would have a larger amount than Barnstable, with about 1,000 miles, or Franklin, with nearly 1,500 miles, while to Suffolk County, with only 53 miles of road outside of city streets, would be allotted about sixteen times as much as to Worcester County, with nearly 3,800 miles of public roads.

A distribution in proportion to area alone, while unquestionably more nearly just than any of the methods already considered, would still be decidedly wrong in some cases, extent of territory being, as a matter of fact, not simply or directly related to the necessity for highways or the cost of their construction or maintenance.

There remains the basis of distribution which the Commission adopted in the beginning, and under which its work has thus far proceeded in a manner apparently satisfactory to all most deeply concerned in the matter. It consists in distributing the sum to be applied to road construction among the several counties in proportion to the number of miles of roadway already existing and maintained in these counties, not including city streets. Having shown that the application of any other of the several suggested and available principles would result in what we believe all would consider an unreasonable and unfair apportionment, it may be well to give one or two reasons why the Commission believes that the rule under which it is working is fair and just, at least much more nearly so than any other that has yet presented itself.

In the first place it must not be forgotten that the appropriations which the Commission expends are distinctly "State road" appropriations. The titles of the several acts under which the work is being done are instructive as showing what the original intent of these acts was.

The first was to "establish a Commission to improve the highways of the Commonwealth." Other titles contain the following: "To improve the public roads;" "the construction of State highways;" "the construction of macadamized roads in towns;" "aiding towns in the construction and maintenance of better roads," etc., etc. These are cited as showing the evident purpose of the Legislature to improve and better the condition of the highways of the entire Commonwealth, and not especially of any particular part of it.

It could hardly be expected that all of the existing roadways would be taken over by the State, improved and maintained, but that such a selection should be made as in the judgment of the local authorities and the Highway Commission (for the law provides that both shall share in this selection) is justified by the necessities of the people,

both generally and locally. If all State roads were to be newly laid out and built it would require a most elaborate investigation and great judgment on the part of the Commission to determine, even with only a fair degree of approximation, where they should be located that they might be of the greatest benefit to the greatest number. Fortunately a much more certain process has been going on for about two hundred years, the natural evolution of lines of travel and transportation, and it may be confidently assumed to-day that where roads exist there are good reasons for their existence. In short, it seems to the Commission that the surest evidence of a demand for public highways is their existence, and that their improvement and more perfect maintenance may wisely be made proportionate thereto. "To improve the public roads" we must go where these roads are. When the Commonwealth or the National Government appropriates a sum for the improvement of harbors it naturally assumes that the money will be spent in that part of the State where harbors exist, and in the just distribution of such a fund along the coast regard would be had to the number of these harbors and their importance, as shown by their use, and not to the area of the counties in which they happened to be or to other less directly related facts.

For these reasons the Commission agreed that the money for the construction of State roads would be "fairly apportioned" by dividing it in proportion to the amount of existing roadway. It further agreed that in determining county shares by this rule city streets should be omitted. The reasons for omitting city streets seemed obvious, being largely on account of the facts that city streets are for the most part already well paved; that they exist where the assessed valuation per mile of highway is greater, assistance from the State being, therefore, less needed; and especially that difficulties of administration would be almost certain to arise out of the mixed jurisdiction which would necessarily exist if city streets were to be taken as State roads. It ought to be said, however, that if city streets were included in the calculation the resulting apportionment would not differ materially from that now adopted.

Having established, as we believe, the correctness of the method of allotment which has been followed from the beginning, we desire to remark upon the limitation or restriction placed upon the Commission by the clause of the statute which forbids the construction of more than ten miles of State road in one county in one year without permission from the Governor and Council.

In considering this provision of the act it is of the utmost importance to bear in mind the fact that when it was adopted the appropriation for the entire cost of road construction, office and engineering expenses, for one year, was only three hundred thousand (\$300,000)

dollars. Furthermore, it may be fairly assumed that the object of the restriction was to prevent the Commission from going beyond what might be considered a "fair apportionment" to any one county, without the consent of the Governor and Council. It was very well understood at the time of the passage of the act that under the system of apportionment adopted by the Commission it would be impossible to construct as much as ten miles of roadway in one county in one year, but as it was thought that conditions might possibly arise under which an excessive expenditure over and above what the mileage system of apportionment would permit might appear to be necessary or very desirable in the interests of economy, a permissive clause for doing this under approval of the Governor and Council was inserted in the act. Thus it appears very evident that this clause was not intended to interfere with the distribution of road construction under the system adopted by the Commission, but on the contrary, it was so drawn as to allow an expenditure in certain cases beyond what that system provided as a "fair apportionment." At that time no one foresaw that the annual appropriation would be more than doubled within three years. With the largely increased appropriation, together with the lessening cost of construction due to experience and better organization, a fair apportionment of construction compels the Commission to build more than ten miles of road in one county in one year. If the limit beyond which it could not go without the permission of the Governor and Council was increased in proportion to the increase of the appropriation, as would be obviously just, it could not have been reached, and no such permission would have been required. That it was not intended to limit construction to ten miles of road in any one county in any one year under a \$300,000 appropriation, is shown by the very paragraph under discussion, for it provides a way for the construction of any number of miles in excess of ten, if the reasons for so doing are satisfactory to the Governor and Council. It is difficult to see, therefore, why under a \$600,000 or \$800,000 appropriation an apportionment which still falls short of being "fair" according to the system always in use should be disapproved because it applies a construction somewhat in excess of ten miles. In other words, a provision of the statute which was made, under a \$300,000 appropriation, for the purpose of allowing, under certain conditions, an apportionment to a single county in excess of what was "fair" according to a general rule, becomes under a \$600,000 appropriation a restriction upon the Commission which prevents it from making a "fair" apportionment, which by the same statute it is required to do.

The facts regarding Worcester County are as follows: —

Being by far the largest county in the Commonwealth, and by far the most important in agricultural industries, it has much the largest

mileage of existing highways, its territory including 22 per cent. of the whole mileage of the State, excluding city streets.

By the rule of the Commission it is entitled, therefore, to 22 per cent. of the sum available for road construction. From the beginning of road construction under the act of 1894 it has not been possible strictly to apply the road mileage system of apportionment, owing to a lack of acceptable petitions from some of the counties in the earlier years, the method of petitioning not being everywhere understood. This has resulted in a necessary under-allotment in some counties and an over-allotment in others. The allotments to Worcester County have always been somewhat short of the amount to which it is entitled. With an ample supply of petitions the Commission has endeavored to partially correct in the apportionment for this year the excesses and deficiencies of past allotments, but in the case of Worcester County, even if we are allowed to expend the amount which has been apportioned to that county, it will still be about \$56,000 short of what it is justly entitled to.

In our request to be allowed to build more than ten miles of road this year in Worcester County we are seeking for no special favor or consideration for that county, but only for permission to "fairly apportion" the construction of State roads, as is required by the statute. We have already shown that the necessity for such a request grows out of the fact alone that a limitation which was entirely proper under a small appropriation will, unless it is removed by permission of Your Excellency and the Council, actually prevent a just and fair apportionment when the sum of money available is two or three times as large. Under such a ruling the disproportion of allotments will continually grow larger and larger and the injustice to large counties continually greater and greater.

Believing that this is a condition neither implied by the letter of the law nor in harmony with its spirit, and being charged with the great responsibility of making, as far as we may be able, a fair apportionment of the money appropriated by the Legislature, we have ventured to present our views at some length, as explanatory of a respectful request for a reconsideration of the question by your honorable body.

Yours respectfully,

T. C. MENDENHALL,
N. S. SHALER,
W. E. McCLINTOCK,

Massachusetts Highway Commission.

SHOWING THE EXPENDITURE FOR STATE HIGHWAYS IN THE VARIOUS COUNTIES OF THE STATE.

COUNTY.	Miles of Road ¹	Per Cent. of Total Mileage.	Expended for Construction in 1894, 1895, 1896.	Per Cent. of Total Expenditure for Construction.	Per Cent. Allotted, 1897.	Per Cent. of Total Allotment.	Expended for Construction in 1894, 1895, 1896, and Allotted in 1897.	Per Cent. of Total Expended and Allotted.	Amounts to which Counties are entitled on Basis of Miles of Road.	Over Allowed.	Under Allowed.
Barnstable,	1,024	5.97	\$44,007 93	3.996	\$43,450	8.170	\$87,457 93	5.356	\$97,485	-	\$10,027
Berkshire,	1,475	8.61	96,192 18	8.736	31,150	5.857	127,342 10	7.798	140,593	-	13,251
Bristol,	963	5.62	94,867 74	8.615	18,200	3.422	113,067 74	6.924	91,762	\$21,306	-
Dukes,	196	1.14	44,388 66	4.031	9,300	1.748	53,688 66	3.287	18,615	35,074	-
Essex,	1,090	6.36	64,731 82	5.878	46,500	8.744	111,231 82	6.811	103,853	7,379	-
Franklin,	1,459	8.50	74,760 02	6.789	34,250	6.440	109,010 02	6.675	138,798	-	29,788
Hampden,	1,143	6.67	105,926 32	9.619	17,750	3.337	123,676 32	7.574	108,915	14,761	-
Hampshire,	1,180	6.92	107,604 39	9.771	23,500	4.419	131,104 39	8.029	112,998	18,106	-
Middlesex,	2,073	12.09	83,540 45	7.586	74,350	13.981	157,890 45	9.069	197,419	-	39,529
Nantucket,	114	0.67	30,074 40	2.731	6,500	1.222	36,574 40	2.239	10,940	25,634	-
Norfolk,	1,153	6.72	63,645 21	5.961	38,150	7.174	103,795 21	6.357	109,732	-	5,937
Plymouth,	1,458	8.50	121,179 52	11.004	29,560	5.558	150,739 52	9.231	138,798	11,942	-
Suffolk,	53	0.31	-	-	25,000	4.701	25,000 00	1.531	5,062	19,938	-
Worcester,	3,758	21.92	168,236 18	15.278	134,100	25.218	302,336 18	18.515	357,935	-	55,599
Total,	17,145	100.00	\$1,101,154 74	99.997	\$531,760	99.991	\$1,632,914 74	99.996	-	-	-

¹ Exclusive of city streets.

APPENDIX L.

STATEMENT SHOWING ALL PETITIONS RECEIVED,
WITH LENGTHS OF WAY PETITIONED FOR, AND
LAY-OUTS MADE, TOGETHER WITH SUMMARY BY
COUNTIES.*Barnstable County.*

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
					1894-96.		1897.	
			Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
Barnstable, ¹ . . .	125	July 31, 1895.	10,548	2.00	-	-	-	-
Barnstable, ² . . .	231	Feb. 13, 1896,	10,560	2.00	-	-	4,452	.84
Bourne, ³ . . .	124	Jan. 29, 1895,	16,125	3.05	-	-	-	-
Bourne, ⁴ . . .	338	May 1, 1897,	7,470	1.42	-	-	1,836	.35
Brewster, . . .	118	Jan. 15, 1895,	40,982	7.76	7,500	1.42	5,617	1.06
Chatham, . . .	155	Apr. 4, 1895,	10,639	2.01	-	-	-	-
Deunis, ¹ . . .	102	Nov. 27, 1894,	22,500	4.27	7,565	1.43	6,032	1.14
Dennis, ² . . .	126	Feb. 6, 1895,	17,225	3.26	-	-	-	-
Eastham, . . .	209	Aug. 5, 1895,	34,141	6.47	-	-	-	-
Harwich, . . .	106	Dec. 22, 1894,	26,150	4.95	-	-	-	-
Orleans, . . .	182	May 27, 1895,	10,440	1.98	-	-	-	-
Provincetown, . . .	186	June 4, 1895,	14,790	2.80	-	-	-	-
Sandwich, . . .	98	Nov. 23, 1894,	9,000	1.70	-	-	5,230	1.00
Truro, . . .	95	Oct. 22, 1894,	12,478	2.36	12,478	2.36	-	-
Truro, . . .	386	Dec. 1, 1897,	20,503	3.88	-	-	-	-
Wellfleet, . . .	229	Jan. 30, 1896,	10,203	1.93	-	-	-	-
Yarmouth, ¹ . . .	90	Sept. 28, 1894,	19,634	3.72	19,585	3.71	-	-
Yarmouth, ² . . .	100	Nov. 26, 1894,	26,900	5.10	15,746	2.99	11,079	2.10
Totals, . . .	.	.	320,288	60.66	62,874	11.91	34,296	6.49

Eighteen petitions, in thirteen towns.

Average distance petitioned for, 17,794 feet (3.37 miles).

Twenty-three lay outs, in seven towns; all lay-outs on town petitions.

Distance laid out, 97,170 feet (18.40 miles); average, 4,226 feet (.80 mile).

Percentage of length laid out to length petitioned for, 30.33.

¹ North county road.² South county road.³ Sandwich road.⁴ Wareham road.

Berkshire County.

COUNTY, CITY OR TOWN	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Adams, ^{1,2}	48	July 18, 1894,	12,298	2.33	-	-	-	-
Adams, ³	279	July 30, 1896,	5,280	1.00	-	-	3,000—	.57
Adams, ⁴	376	Oct. 16, 1897,	12,582	2.38	-	-	-	-
Becket,	117	Jan. 12, 1895,	10,560	2.00	-	-	-	-
Berkshire County, ⁵ .	46	July 18, 1894,	12,298	2.33	-	-	-	-
Berkshire County, ⁶ .	47	July 18, 1894,	9,018	1.71	8,295	1.57	618	.12
Berkshire County, ⁷ .	82	Aug. 13, 1894,	10,560	2.00	10,560	2.00	-	-
Berkshire County, ⁸ .	83	Aug. 13, 1894,	5,200	.99	5,188	.98	-	-
Berkshire County, ⁹ .	170	May 10, 1895,	6,289	1.19	6,200	1.18	-	-
Berkshire County, ⁸ .	187	June 6, 1895,	5,300	1.00	5,292	1.00	-	-
Berkshire County, ¹⁰ .	275	July 25, 1896,	5,280	1.00	-	-	-	-
Berkshire County, ¹¹ .	276	July 25, 1896,	5,280	1.00	-	-	-	-
Berkshire County, ¹² .	277	July 25, 1896,	5,260	1.00	-	-	-	-
Berkshire County, ¹³ .	278	July 25, 1896,	5,280	1.00	-	-	-	-
Berkshire County, ⁹ .	293	Sept. 21, 1896,	8,580	1.62	2,704	.51	-	-
Berkshire County, ⁹ .	330	Mar. 9, 1897,	2,574	.48	-	-	-	-
Cheshire, ¹	331	Mar. 11, 1897,	5,260	1.00	-	-	-	-
Dalton, ¹⁴	26	June 10, 1894,	12,695	2.40	-	-	-	-
Dalton, ¹⁴	176	May 14, 1895,	6,300	1.20	5,459	1.03	-	-
Dalton, ¹⁴	238	Apr. 1, 1896,	6,190	1.17	2,800	.53	-	-
Dalton, ¹⁵	313	Jan. 29, 1897,	3,300	.63	-	-	-	-
Dalton, ¹⁵	340	May 18, 1897,	5,450	1.04	-	-	-	-
Florida,	74	Aug. 1, 1895,	26,853	5.09	-	-	-	-
Great Barrington, ^{16,17} .	82	- -	10,560	2.00	10,560	2.00	-	-
Great Barrington, ¹⁷ .	267	June 18, 1896,	10,282	1.95	1,243	.24	2,903	.55
Hancock, ^{16,18}	170	- -	6,289	1.19	6,200	1.18	-	-
Hancock, ^{16,18}	293	- -	8,580	1.62	2,704	.51	-	-
Hancock, ^{16,18}	330	- -	2,574	.48	-	-	-	-
Hinsdale,	156	Apr. 6, 1895,	5,619	1.06	-	-	-	-

¹ Duplicate county petition.³ Maple Grove road.⁵ See Adams.⁷ See Great Barrington.⁹ See Hancock.¹¹ See Savoy.¹³ See Lanesborough.¹⁶ Pittsfield-Springfield road.¹⁷ Monterey road.² Cheshire-Savoy road.⁴ North Adams road.⁶ See North Adams.⁸ See Lee.¹⁰ See Otis.¹² See Cheshire.¹⁴ Pittsfield-Northampton road.¹⁶ On county petition.¹⁸ State line road.

Berkshire County — Concluded.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Lee, ^{1,2}	83	- -	5,200	.99	5,188	.98	-	-
Lee, ^{1,2}	187	- -	5,300	1.00	5,292	1.00	-	-
Lee, ³	252	May 25, 1896,	5,280	1.00	-	-	-	-
Lee, ⁴	348	June 14, 1897,	6,762	1.28	-	-	-	-
Lenox, ⁵	178	May 16, 1895,	5,280	1.00	-	-	-	-
Lenox, ⁵	316	Feb. 7, 1897,	6,770	1.28	-	-	-	-
Lanesborough, ¹ . . .	278	- -	5,280	1.00	-	-	-	-
Monterey,	256	June 5, 1896,	5,900	1.12	-	-	-	-
Mount Washington, .	92	Oct. 1, 1894,	8,300	1.58	-	-	-	-
North Adams, ^{1,6} . .	47	- -	9,018	1.71	8,295	1.57	618	.12
North Adams, ⁷ . .	254	May 27, 1896,	5,742	1.09	-	-	-	-
North Adams, ⁸ . .	393	Dec. 22, 1897,	12,436	2.36	-	-	-	-
Otis, ¹	275	- -	5,280	1.00	-	-	-	-
Pittsfield, ⁹	78	Aug. 7, 1894,	24,087	4.56	5,280	1.00	-	-
Pittsfield, ¹⁰	259	June 10, 1896,	5,900	1.12	-	-	4,040	.76
Richmond, ¹¹	198	June 4, 1895,	10,462	1.98	-	-	-	-
Richmond, ¹²	248	May 9, 1896,	5,280	1.00	-	-	2,500	.48
Savoy, ¹	276	- -	5,280	1.00	-	-	-	-
Stockbridge,	136	Feb. 26, 1895,	10,700	2.02	-	-	-	-
West Stockbridge, . .	166	Sept. 30, 1895,	6,146	1.16	-	-	-	-
Williamstown, . . .	145	Mar. 10, 1895,	10,576	2.00	6,497	1.23	-	-
Windsor,	36	July 12, 1894,	42,787	8.10	-	-	1,501	.28
Totals, . . . .	.	.	358,438	67.89	59,518	11.27	14,562	2.76

Forty-one petitions (twelve county, five city and twenty-four town), in two cities and twenty towns.

Average distance petitioned for, 8,742 feet (1.66 miles).

Twenty-three lay-outs in two cities and eight towns.

Length laid out on county petitions, 38,857 feet (7.36 miles).

Length laid out on city petitions, 9,320 feet (1.76 miles).

Length laid out on town petitions, 25,903 feet (4.91 miles).

Total length laid out, 74,080 feet (14.03 miles); average, 3,221 feet (.61 mile).

Percentage of length laid out to distance petitioned for, 20.67.

¹ On county petition.

³ South Lee road.

⁵ Lee road.

⁷ West Main Street.

⁹ Hancock road.

¹¹ East road to Pittsfield.

² Becket road.

⁴ Lenox road.

⁶ Williamstown road.

⁸ Adams road.

¹⁰ Dalton road.

¹² Main Street.

Bristol County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Acushnet, ¹ . . .	96	Oct. 24, 1894,	35,500	6.73	-	-	3,363	.64
Acushnet, ² . . .	97	Oct. 24, 1894,	6,326	1.20	-	-	-	-
Attleborough, ³ . . .	183	May 29, 1895,	14,153	2.68	-	-	-	-
Attleborough, ⁴ . . .	184	May 29, 1895,	5,112	.97	-	-	-	-
Attleborough, ⁵ . . .	268	June 18, 1896,	14,246	2.70	-	-	-	-
Berkley, . . .	281	Aug. 3, 1896,	22,728	4.30	-	-	-	-
Bristol County, ⁶ . . .	53	July, 24, 1894,	48,070	9.11	15,840	3.00	3,026	.57
Dartmouth, ⁷ . . .	22	July, 9, 1894,	24,000	4.55	-	-	-	-
Dighton, ⁸ . . .	150	Mar. 26, 1895,	24,576	4.65	-	-	-	-
Dighton, ⁹ . . .	226	Jan. 2, 1896,	8,261	1.56	-	-	-	-
Easton, ¹⁰ . . .	139	Mar. 1, 1895,	39,000	7.39	-	-	-	-
Easton, ¹¹ . . .	365	Sept. 2, 1897,	4,300	.81	-	-	-	-
Fairhaven, . . .	31	July 10, 1894,	20,100	3.80	7,653	1.45	-	-
Freetown, . . .	314	Feb. 3, 1897,	16,850	3.20	-	-	-	-
Mansfield, . . .	341	Apr. 8, 1897,	5,121	.97	-	-	-	-
New Bedford, . . .	191	June 18, 1895,	2,950	.56	-	-	-	-
North Attleborough, . .	18	July 5, 1894,	25,550	4.83	14,703	2.78	2,276	.43
Raynham, . . .	134	Feb. 23, 1895,	23,000	4.36	-	-	-	-
Rehoboth, . . .	132	Feb. 20, 1895,	29,186	5.53	8,193	1.55	-	-
Seekonk, . . .	127	Feb. 6, 1895,	14,591	2.76	-	-	-	-
Somerset, . . .	147	Mar. 30, 1895,	29,800	5.64	7,487	1.42	3,343	.63
Swansea, . . .	235	Mar. 10, 1896,	36,515	6.92	-	-	-	-
Taunton, ¹² . . .	171	May 11, 1895,	25,864	4.89	-	-	-	-
Taunton, ¹³ . . .	179	May 16, 1895,	23,752	4.50	6,300	1.20	-	-
Taunton, ^{14,15} . . .	180	May 19, 1895,	13,200	2.50	-	-	-	-
Westport, ¹⁶ . . .	53	-	24,070	4.56	15,840	3.00	3,026	.57
Totals, . . .			482,385	91.36	60,176	11.40	12,008	2.27

Twenty-five petitions (one county, four city, twenty town) in two cities and sixteen towns.

Average distance petitioned for, 12,060 feet (2.29 miles).

Eighteen lay-outs in one city and six towns.

Laid out on county petition, 13,866 feet (3.57 miles).

Laid out on city petitions, 6,300 feet (1.20 miles).

Laid out on town petitions, 47,018 feet (8.90 miles).

Length laid out, 72,184 feet (13.67 miles); average, 4,010 feet (.76 mile).

Percentage of length laid out to length petitioned for, 18.83.

¹ New Bedford-Boston road.

² Washington Street (turnpike).

³ Washington and Horton streets.

⁷ Duplicate of county petition.

⁹ Taunton-Providence road.

¹¹ Brockton-Mansfield road.

¹³ Winthrop Street (Taunton-Providence road).

¹⁵ No plan; distance scaled on map.

² Fairhaven road.

⁴ North Avenue.

⁶ See Dartmouth and Westport.

⁸ Taunton-Fall River road.

¹⁰ Boston Taunton road.

¹² Somerset Avenue and Dean Street.

¹⁴ Broadway (Boston turnpike).

¹⁶ On county petition.

Essex County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Amesbury, . . .	203	July 22, 1895,	27,977	5.30	-	-	-	-
Andover, . . .	20	July 6, 1894,	31,400	5.95	6,386	1.22	2,550	.48
Beverly, ¹ . . .	64	- -	13,900	2.64	7,806	1.47	307	.06
Boxford, . . .	395	Dec. 23, 1897,	25,125	4.76	-	-	-	-
Danvers, . . .	351	June 29, 1897,	6,267	1.18	-	-	-	-
Essex, . . .	364	Aug. 3, 1897,	22,412	4.24	-	-	-	-
Essex County, ² . .	64	July 30, 1894,	53,800	10.19	7,806	1.47	3,501	.67
Georgetown, . . .	390	Dec. 16, 1897,	16,800	3.18	-	-	-	-
Gloucester, ³ . . .	28	July 10, 1894,	9,650	1.83	8,452	1.60	-	-
Gloucester, ^{4,5} . . .	110	Jan. 1, 1895,	54,120	10.25	-	-	-	-
Gloucester, ³ . . .	380	Apr. 5, 1897,	1,050	.19	-	-	-	-
Groveland, . . .	211	Aug. 8, 1895,	23,948	4.53	-	-	-	-
Hamilton, ¹ . . .	64	- -	18,100	3.43	-	-	-	-
Haverhill, . . .	297	Nov. 4, 1896,	13,888	2.63	-	-	-	-
Ipswich, ^{1,6} . . .	64	- -	12,700	2.40	-	-	-	-
Ipswich, ⁷ . . .	239	Apr. 4, 1896,	11,900	2.25	-	-	-	-
Lawrence, ^{5,8} . . .	76	Aug. 2, 1894,	2,640	.50	-	-	-	-
Lawrence, ^{5,9} . . .	245	May 4, 1896,	4,660	.88	-	-	-	-
Lawrence, ^{5,8} . . .	284	Aug. 25, 1896,	2,300	.44	-	-	-	-
Lawrence, ^{5,10} . . .	285	Aug. 25, 1896,	1,750	.33	-	-	-	-
Lawrence, ¹¹ . . .	290	Sept. 11, 1896,	1,408	.27	1,408	.27	-	-
Lynn, . . .	342	May 20, 1897,	9,120	1.73	-	-	-	-
Manchester, . . .	167	May 1, 1895,	5,280	1.00	-	-	-	-
Merrimac, . . .	204	July 26, 1895,	15,134	2.87	-	-	2,959	.56
Methuen, . . .	287	Aug. 31, 1896,	20,184	3.82	5,478	1.04	-	-
Methuen, . . .	387	Dec. 8, 1897,	5,280	1.00	-	-	-	-
Middleton, . . .	347	June 12, 1897,	26,501	5.02	-	-	-	-
Newbury, . . .	197	July 2, 1895,	22,238	4.24	-	-	-	-
Newburyport, . . .	196	July 1, 1895,	10,100	1.91	3,641	.69	1,018	.19
North Andover, . .	274	July 1, 1896,	10,186	1.93	-	-	-	-
Peabody, ¹² . . .	352	July 1, 1897,	5,280	1.00	-	-	-	-

¹ On county petition.³ Western Avenue.⁵ No plan; distance scaled on map.⁷ North of Arch Bridge.⁹ South Broadway to Andover line.¹¹ Jackson Street to Methuen line.² See Beverly, Wenham, Ipswich and Hamilton.⁴ Essex Avenue, Washington Street and Rockport road.⁶ South of Arch Bridge.⁸ Haverhill Street to Methuen line.¹⁰ Prospect Street to Methuen line.¹² From Lynn line; Washington and Lynn streets.

Essex County — Concluded.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
					1894-96.		1897.	
			Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
Peabody, ¹ . . .	353	July 1, 1897,	12,120	2.30	-	-	-	-
Rockport, . . .	135	Feb. 23, 1895,	5,736	1.08	-	-	-	-
Rowley, . . .	242	Apr. 23, 1896,	19,270	3.65	-	-	-	-
Salisbury, . . .	243	Apr. 27, 1895,	10,560	2.00	-	-	-	-
Saugus, . . .	34	July 11, 1894,	8,811	1.67	-	-	-	-
Swampscott, . . .	375	Oct. 14, 1897,	8,780	1.66	-	-	5,449	1.03
Topsfield, . . .	383	Nov. 27, 1897,	26,031	4.95	-	-	-	-
Wenham, ² . . .	64	- -	9,100	1.73	-	-	3,194	.61
West Newbury, ³ . . .	101	Nov. 26, 1894,	27,017	5.11	10,417	1.97	1,314	.25
West Newbury, ⁴ . . .	206	July 29, 1895,	4,000	.76	-	-	-	-
Totals, . . .	.	.	562,993	106.63	43,288	8.20	16,791	3.18

Thirty-seven petitions (one county, eleven city, twenty-five town) in six cities and twenty-four towns.

Average distance petitioned for, 15,216 feet (2.88 miles).

Seventeen lay-outs in four cities and six towns.

Laid out on county petition, 11,007 feet (2.08 miles).

Laid out on city petitions, 14,519 feet (2.75 miles).

Laid out on town petitions, 34,553 feet (6.55 miles).

Length laid out, 60,079 feet (11.38 miles); average, 3,534 feet (.67 mile).

Percentage of road laid out to road petitioned for, 10.67.

¹ From Danvers line; Sylvan and Andover streets. ² On county petition.

³ Haverhill-Newburyport road.

⁴ Proposed relocation over Pipe Stave Hill.

Franklin County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Ashfield, ²	195	June 26, 1895,	5,300	1.00	-	-	-	-
Ashfield, ¹	367	Sept. 18, 1897,	8,900	1.70	-	-	3,907	.74
Buckland, ^{3,4}	38	July 14, 1894,	1,152	.22	796	.15	-	-
Buckland, ⁴	112	Jan. 5, 1895,	5,280	1.00	5,308	1.00	-	-
Buckland, ⁴	224	Dec. 28, 1895,	5,280	1.00	2,439	.46	2,886	.55
Buckland, ⁴	315	Feb. 15, 1897,	5,274	1.00	-	-	-	-
Charlemont,	120	Jan. 18, 1895,	7,500	1.42	-	-	2,040	.39
Colrain, ³	43	July 17, 1894,	1,062	.20	-	-	-	-
Colrain,	133	Feb. 20, 1895,	12,438	2.36	-	-	-	-
Conway,	215	Sept. 4, 1895,	14,147	2.68	-	-	-	-
Deerfield, ^{5,6}	24	-	9,400	1.79	8,093	1.53	-	-
Deerfield, ⁷	329	Mar. 10, 1897,	36,960	7.00	-	-	-	-
Erving, ³	152	Mar. 29, 1895,	10,717	2.03	-	-	-	-
Franklin County, ⁸	24	July 9, 1894,	69,170	13.10	27,577	5.23	5,246	.99
Gill,	130	Feb. 7, 1895,	10,520	1.99	-	-	-	-
Greenfield, ⁹	188	June 10, 1895,	23,700	4.49	-	-	-	-
Greenfield, ¹⁰	332	Mar. 23, 1897,	6,722	1.27	-	-	-	-
Greenfield, ¹¹	397	Dec. 23, 1897,	5,300	1.00	-	-	-	-
Montague, ¹²	359	July 11, 1897,	6,587	1.25	-	-	-	-
Montague, ¹³	360	July 11, 1897,	8,305	1.57	-	-	-	-
Montague, ¹⁴	304	Dec. 18, 1896,	10,560	2.00	-	-	-	-
New Salem,	258	June 8, 1896,	27,300	5.17	-	-	-	-
Orange, ³	6	July 2, 1894,	30,550	5.74	9,230	1.75	2,314	.44
Orange, ³	103	Dec. 10, 1894,	5,280	1.00	-	-	-	-
Orange, ³	301	Nov. 27, 1896,	2,800	.43	-	-	-	-
Shelburne, ^{3,15}	35	July 11, 1894,	12,138	2.30	9,458	1.79	1,940	.37
Shelburne, ¹⁶	227	Jan. 13, 1896,	5,300	1.00	-	-	-	-
Sunderland, ³	52	July 24, 1894,	4,151	.80	-	-	992	.17
Whately,	325	Feb. 28, 1897,	5,400	1.02	-	-	-	-
Totals, . . . .	.	.	278,881	52.82	35,324	6.68	14,079	2.66

Twenty-eight petitions (one county and twenty-seven town) in fifteen towns.

Average distance petitioned for, 9,960 feet (1.88 miles).

Seventeen lay-outs, in seven towns.

Laid out on county petitions, 32,823 feet (6.22 miles).

Laid out on town petitions, 16,580 feet (3.12 miles).

Total length laid out, 49,403 feet (9.34 miles). Average, 2,906 feet (.55 mile).

Percentage of length laid out to length petitioned for, 18.94.

¹ Shelburne Falls road, relocation.

³ Duplicate of county petition.

⁵ On county petition.

⁷ Greenfield-Northampton road.

⁹ Bernardston road. Plan for 5,300 feet; balance scaled on map.

¹¹ Shelburne road.

¹³ Miller's Falls road, via L Street.

¹⁵ Colrain road.

² Shelburne Falls road.

⁴ Ashfield road.

⁶ Sunderland road.

⁸ See Buckland, Colrain, Deerfield, Erving, Orange, Shelburne and Sunderland.

¹⁰ Deerfield road.

¹² Miller's Falls road, via Pipe Line.

¹⁴ Miller's Falls road, via Ferry road.

¹⁶ Greenfield road.

Hampden County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	s.
Blandford, ¹ . . .	216	Sept. 7, 1895,	13,337	2.54	-	-	-	-
Blandford, ² . . .	321	Feb. 23, 1897,	13,858	2.63	-	-	-	-
Brimfield, ³ . . .	40	July 6, 1894,	36,370	6.89	-	-	6,160	1.17
Brimfield, ^{4,5} . . .	131	- -	9,355	1.77	-	-	-	-
Chester, . . .	104	Dec. 11, 1894,	5,280	1.00	-	-	-	-
Chicopee, . . .	223	Dec. 28, 1895,	5,700	1.08	-	-	3,042	.58
East Longmeadow, . .	202	July 11, 1895,	25,426	4.81	-	-	-	-
Granville, . . .	87	Sept. 6, 1894,	9,216	1.75	-	-	-	-
Hampden, . . .	201	July 11, 1895,	18,031	3.41	-	-	-	-
Hampden County, ⁶ . .	19	July 6, 1894,	100,480	19.03	36,045	6.83	3,974	.75
Hampden County, ⁷ . .	131	Feb. 12, 1895,	90,064	17.06	5,276	1.00	-	-
Hampden County, ⁸ . .	241	Apr. 23, 1896,	2,400	.46	-	-	-	-
Hampden County, ⁹ . .	273	July 3, 1896,	5,300	1.00	-	-	-	-
Holyoke, ⁴ . . .	273	- -	5,300	1.00	-	-	-	-
Longmeadow, . . .	333	Mar. 24, 1897,	5,400	1.02	-	-	-	-
Ludlow, . . .	236	Mar. 11, 1896,	14,831	2.80	-	-	-	-
Monson, ¹⁰ . . .	57	July 26, 1894,	14,960	2.83	4,933	.93	-	-
Monson, ^{4,5} . . .	131	- -	6,925	1.31	-	-	-	-
Palmer, ⁴ . . .	131	- -	46,034	8.72	-	-	-	-
Russell, ⁴ . . .	19	- -	35,380	6.70	18,296	3.46	3,974	.75
Wales, . . .	41	July 16, 1894,	25,922	4.91	-	-	-	-
Westfield, ⁴ . . .	19	- -	40,900	7.75	9,695	1.84	-	-
West Springfield, ¹¹ . .	113	Jan. 8, 1895,	24,200	5.58	8,054	-	-	-
West Springfield, ⁴ . .	241	- -	2,400	.46	-	-	-	-
Wilbraham, ⁴ . . .	131	- -	27,750	5.26	5,276	1.00	-	-
Wilbraham, . . .	247	May 8, 1896,	4,140	.78	3,073	.58	1,789	.34
Totals, . . .	.	.	390,715	74.00	49,327	9.34	14,965	2.84

Eighteen petitions (four county, one city and thirteen town) in two cities and fifteen towns.

Average distance petitioned for, 21,709 feet (4.11 miles).

Twenty lay-outs in one city and six towns.

Laid out on county petitions, 45,295 feet (8.58 miles).

Laid out on city petitions, 3,042 feet (.58 mile).

Laid out on town petitions, 15,955 feet (3.02 miles).

Total length laid out, 64,292 feet (12.18 miles); average, 3,215 feet (.61 mile).

Percentage of length laid out to length petitioned for, 16.45.

¹ Huntington road.

² Russell road.

³ Road to Brimfield Centre.

⁴ On county petition.

⁵ River road.

⁶ See Westfield, Russell and W. Springfield.

⁷ See Brimfield, Monson, Palmer and Wilbraham.

⁸ See West Springfield (Agawam road).

⁹ See Holyoke.

¹⁰ Palmer road.

¹¹ Duplicate of county petition.

Hampshire County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Amherst,	181	May 18, 1895,	5,356	1.02	-	-	-	-
Belchertown, ¹	220	Nov. 18, 1895,	5,280	1.00	-	-	-	-
Belchertown, ¹	282	Aug. 6, 1896,	5,280	1.00	-	-	-	-
Chesterfield, ²	128	Feb. 6, 1895,	3,030	.74	-	-	-	-
Cummington, ²	27	July 10, 1894,	55,053	10.43	-	-	-	-
Easthampton, ^{3,4}	114	Jan. 10, 1895,	5,854	1.11	-	-	-	-
Easthampton, ^{2,5}	189	July 10, 1895,	6,800	1.29	6,963	1.32	-	-
Enfield,	283	Aug. 25, 1896,	9,593	1.81	-	-	-	-
Goshen, ²	2	June 28, 1894,	29,480	5.58	10,658	1.91	-	-
Granby, ³	5	-	3,347	.63	3,347	.63	-	-
Granby,	289	Sept. 9, 1896,	10,700	2.03	-	-	-	-
Greenwich,	295	Oct. 17, 1896,	5,464	1.03	-	-	-	-
Hadley, ^{2,5}	94	Oct. 20, 1894,	5,667	1.08	5,676	1.08	-	-
Hadley, ⁵	200	July 11, 1895,	4,133	.78	2,150	.41	1,533	.29
Hadley, ⁵	284	Aug. 27, 1896,	14,766	2.80	-	-	-	-
Hampshire County, ⁶	5	June 29, 1894,	154,192	29.19	34,781	6.58	3,965	.75
Hatfield, ⁷	164	Apr. 23, 1895,	2,500	.47	-	-	-	-
Hatfield, ⁸	165	Apr. 23, 1895,	5,280	1.00	-	-	-	-
Huntington,	99	Nov. 24, 1894,	14,408	2.73	5,336	1.01	-	-
Middlefield,	177	May 14, 1895,	5,400	1.03	-	-	-	-
Northampton, ^{2,9}	67	July 31, 1894,	2,997	.56	2,997	.56	-	-
Northampton, ^{2,10}	194	June 25, 1895,	5,280	1.00	-	-	1,753	.33
South Hadley, ³	5	-	15,571	2.95	2,640	.50	2,212	.42
South Hadley, ²	288	Sept. 3, 1896,	8,816	1.67	-	-	-	-
Southampton,	253	May 25, 1896,	5,280	1.00	-	-	-	-
Ware,	205	July 29, 1895,	4,100	.77	-	-	1,788	.34
Williamsburg, ³	5	-	26,063	4.94	3,100	.58	-	-
Williamsburg, ^{2,11}	129	Feb. 6, 1895,	11,908	2.26	-	-	-	-
Williamsburg, ^{2,12}	249	May 11, 1896,	5,695	1.08	-	-	-	-
Totals, . . . . .	.	.	257,582	48.78	42,267	8.00	7,236	1.38

Twenty-six petitions (one county, two city and twenty-three town) in one city and seventeen towns.

Average distance petitioned for, 9,907 feet (1.88 miles).

Seventeen lay-outs, in one city, eight towns.

Laid out on county petition, 38,746 feet (7.33 miles).

Laid out on city petition, 2,997 feet (.56 mile).

Laid out on town petition, 7,810 feet (1.29 miles).

Total length laid out, 49,553 feet (9.38 miles); average, 2,915 feet (.55 mile).

Percentage of length laid out to distance petitioned for, 19.16.

¹ Granby road.

² Duplicate of county petition.

³ On county petition.

⁴ Holyoke Street.

⁵ Northampton road.

⁶ See Chesterfield, Cummington, Easthampton, Goshen, Granby, Hadley, Northampton, South Hadley and Williamsburg.

⁷ North Hatfield road.

⁸ Hatfield road.

⁹ Bridge Street.

¹⁰ Easthampton road.

¹¹ Chesterfield road.

¹² Goshen road.

Middlesex County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Acton, ¹	119	Jan. 7, 1895,	9,158	1.73	-	-	-	-
Acton, ¹	138	Feb. 28, 1895,	12,129	2.30	-	-	-	-
Acton, ^{2,3}	233	-	21,922	4.15	-	-	-	-
Ashby,	1	June 27, 1894,	18,625	3.53	9,688	1.84	3,248	.62
Ashland, ⁴	361	July 24, 1897,	11,843	2.24	-	-	-	-
Ashland, ⁵	362	July 24, 1897,	9,112	1.73	-	-	-	-
Ayer,	225	Jan. 1, 1896,	15,546	2.95	-	-	-	-
Bedford,	175	May 14, 1895,	19,636	3.72	-	-	2,872	.54
Belmont,	343	May 21, 1897,	5,109	.97	-	-	-	-
Billerica,	264	June 13, 1896,	18,490	3.50	-	-	-	-
Boxborough, ^{2,3}	233	-	17,508	3.32	-	-	3,591	.68
Burlington,	336	Apr. 16, 1897,	14,207	2.69	-	-	-	-
Carlisle,	109	Dec. 26, 1894,	21,531	4.08	-	-	-	-
Chelmsford, ^{6,7}	50	July 20, 1894,	5,583	1.06	-	-	-	-
Chelmsford, ^{2,7}	266	-	6,030	1.15	-	-	-	-
Concord, ⁸	81	Sept. 11, 1894,	8,550	1.62	-	-	3,394	.64
Concord, ⁹	388	Dec. 7, 1897,	7,068	1.34	-	-	-	-
Dracont,	344	June 3, 1897,	21,378	4.15	-	-	-	-
Dunstable,	291	Sept. 17, 1896,	8,778	1.66	-	-	-	-
Framingham,	303	Dec. 17, 1896,	8,296	1.57	-	-	-	-
Groton, ¹⁰	105	Dec. 17, 1894,	40,215	7.61	-	-	-	-
Groton, ⁶	219	Nov. 14, 1895,	23,140	4.38	-	-	-	-
Holliston,	363	July 30, 1897,	33,480	6.34	-	-	-	-
Hopkinton,	309	Jan. 6, 1897,	20,440	3.87	-	-	-	-
Hudson,	370	Sept. 25, 1897,	31,057	5.89	-	-	-	-
Lexington,	79	Aug. 8, 1894,	18,300	3.46	7,518	1.42	3,640	.69
Lincoln, ⁹	80	Aug. 8, 1894,	10,850	2.05	8,851	1.68	2,034	.39
Lincoln, ¹¹	377	Oct. 30, 1897,	17,800	3.37	-	-	-	-
Lowell, ^{6,12}	55	July 25, 1894,	7,011	1.33	-	-	4,322	.82
Lowell, ^{2,13}	44	-	5,248	1.00	-	-	5,115	.97
Littleton,	218	Nov. 14, 1895,	12,110	2.29	-	-	-	-
Marlborough, ¹⁴	143	Mar. 15, 1895,	12,688	2.40	-	-	3,870	.73
Marlborough, ¹⁵	271	June 26, 1896,	17,135	3.25	-	-	2,142	.41
Maynard,	366	Sept. 9, 1897,	11,164	2.11	-	-	-	-
Medford,	265	June 13, 1896,	4,918	.93	-	-	-	-
Middlesex County, ¹³	44	July 17, 1894,	20,800	3.94	15,588	2.95	5,115	.97
Middlesex County, ¹²	45	July 17, 1894,	12,594	2.39	-	-	4,322	.82
Middlesex County, ³	233	Feb. 25, 1896,	39,430	7.47	-	-	3,591	.63
Middlesex County, ⁷	266	June 15, 1896,	6,030	1.15	-	-	-	-
Middlesex County, ¹⁶	274	July 13, 1896,	11,368	2.15	-	-	-	-
Natick,	251	May 21, 1896,	6,813	1.29	-	-	-	-
Newton,	337	Apr. 26, 1897,	650	.12	-	-	-	-
North Reading,	107	Dec. 24, 1894,	31,060	5.88	-	-	2,640	.50

¹ Littleton road.⁴ Southborough road.⁷ Truant School road.¹⁰ Lowell-Fitchburg road.¹³ Tyngsborough road.¹⁶ Medford Stoneham road.² On county petition.⁵ Pond Street.⁸ Boston (Great) road.¹¹ South Great road.¹⁴ Northborough road.³ Harvard turnpike.⁶ Duplicate of county petition.⁹ Concord-Lexington road.¹² Chelmsford road.¹⁵ Sudbury road.

Middlesex County — Concluded.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Pepperell, . . .	299	Nov. 11, 1896,	18,700	3.54	-	-	-	-
Reading, . . .	157	Apr. 10, 1895,	23,100	4.28	-	-	-	-
Sherborn, . . .	250	May 14, 1896,	5,500	1.04	-	-	-	-
Stoneham, ¹ . . .	280	July 30, 1896,	6,450	1.22	-	-	2,330	.44
Stoneham, ² . . .	355	July 7, 1897,	3,086	.58	-	-	-	-
Stow, . . .	378	Nov. 1, 1897,	24,215	4.59	-	-	-	-
Sudbury, ³ . . .	214	Aug. 24, 1895,	5,300	1.00	-	-	2,193	.41
Sudbury, ³ . . .	230	Feb. 16, 1896,	20,409	3.87	-	-	-	-
Tewksbury, ⁴ . . .	257	June 5, 1896,	14,770	2.80	-	-	-	-
Tewksbury, ⁴ . . .	357	July 8, 1897,	20,188	3.82	-	-	-	-
Townsend, . . .	149	Mar. 21, 1895,	16,830	3.19	3,459	.65	2,493	.47
Tyngsborough, ⁵ . . .	44	-	15,552	2.94	15,588	2.95	-	-
Wakefield, . . .	400	Dec. 29, 1897,	17,979	3.41	-	-	-	-
Watertown, . . .	151	Mar. 27, 1895,	17,736	3.36	4,472	.85	-	-
Wayland, ³ . . .	212	Aug. 10, 1895,	15,450	2.93	-	-	3,206	.61
Wayland, ⁶ . . .	334	Mar. 31, 1897,	11,620	2.20	-	-	-	-
Westford, . . .	115	Jan. 10, 1895,	21,900	4.15	-	-	-	-
Weston, ³ . . .	322	Feb. 24, 1897,	17,509	3.32	-	-	-	-
Weston, ⁶ . . .	323	Feb. 24, 1897,	21,269	4.03	-	-	-	-
Wilmington, ⁷ . . .	345	June 10, 1897,	37,682	7.14	-	-	-	-
Wilmington, ⁸ . . .	349	July 22, 1897,	9,918	1.88	-	-	-	-
Winchester, . . .	244	Apr. 28, 1896,	10,300	1.95	-	-	-	-
Totals, . . .	.	.	920,041	174.25	49,576	9.39	47,090	8.92

Sixty petitions (five county, five city, fifty town) in four cities and forty-one towns.

Average distance petitioned for, 15,334 feet (2.90 miles).

Twenty-seven lay-outs in two cities and thirteen towns.

Laid out on county petitions, 28,616 feet (5.42 miles).

Laid out on city petitions, 6,012 feet (1.14 miles).

Laid out on town petitions, 62,038 feet (11.75 miles).

Total length laid out, 96,666 feet (18.31 miles); average, 3,580 feet (.68 mile).

Percentage of length laid out to distance petitioned for, 10.51.

¹ Duplicate of county petition.

² Main Street to Reading line; plan only for distance shown.

³ Boston road.

⁴ Boston-Lowell road.

⁵ On county petition.

⁶ Boston-Framingham road.

⁷ Boston-Lawrence road.

⁸ Boston-Lowell road.

Nantucket County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Nantucket, . . .	11	July 3, 1894,	34,185	6.50	19,630	3.73	2,640	.50

Six lay-outs.

Length laid out, 22,270 feet (4.23 miles).

Percentage of length laid out to length petitioned for, 65.08.

County of Dukes County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Chilmark, . . .	12	July 3, 1894,	41,237	7.81	-	-	-	-
Cottage City, ¹ . . .	7	- -	13,117	2.48	12,538	2.37	-	-
Cottage City, ¹ . . .	335	- -	2,150	.41	-	-	-	-
Dukes County, ² . . .	7	July 2, 1894,	26,217	4.96	12,538	2.37	-	-
Dukes County, ³ . . .	335	Mar. 27, 1897,	6,919	1.31	-	-	-	-
Edgartown, ¹ . . .	7	- -	13,100	2.48	-	-	1,705	.33
Tisbury, . . .	3	June 28, 1894,	10,609	2.01	10,194	1.93	-	-
Tisbury, . . .	335	- -	4,769	.90	-	-	-	-
West Tisbury, ¹ . . .	4	June 28, 1894,	28,441	5.39	13,200	2.50	1,800	.34
West Tisbury, ⁴ . . .	244	May 29, 1896,	6,912	1.18	-	-	-	-
Totals, . . .	.	.	119,635	22.66	35,932	6.80	3,505	.67

Six petitions (two county, four town), in five towns.

Average distance petitioned for, 19,939 feet (3.78 miles).

Eight lay-outs, in four towns.

Laid out on county petition, 14,243 feet (2.70 miles).

Laid out on town petitions, 25,194 feet (4.77 miles).

Total length laid out, 39,437 feet (7.47 miles); average, 4,930 feet (.93 mile).

Percentage of length laid out to length petitioned for, 32.96.

¹ On county petition.² See Cottage City and Edgartown.³ See Cottage City and Tisbury.⁴ Petition for change of location.

Norfolk County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Bellingham, . . .	173	May 13, 1895,	3,900	.74	-	-	-	-
Braintree, . . .	116	Jan. 10, 1895,	6,700	1.27	-	-	-	-
Cohasset, . . .	158	Apr. 2, 1895,	11,300	2.14	-	-	2,200	.41
Dedham, . . .	307	Dec. 31, 1896,	3,900	.75	-	-	-	-
Foxborough, ¹ . . .	123	Jan. 29, 1895,	29,040	5.50	-	-	-	-
Foxborough, ² . . .	163	Apr. 24, 1895,	5,840	1.11	-	-	-	-
Franklin, . . .	298	Nov. 6, 1896,	9,227	1.75	-	-	-	-
Holbrook, . . .	9	July 10, 1894,	11,848	2.24	5,817	1.11	-	-
Medway, ³ . . .	311	Jan. 18, 1897,	5,535	1.05	-	-	-	-
Medway, ⁴ . . .	368	Sept. 21, 1897,	15,587	2.95	-	-	-	-
Millis, . . .	381	Nov. 12, 1897,	6,265	1.19	-	-	-	-
Milton, . . .	190	June 15, 1895,	5,730	1.09	-	-	-	-
Needham, . . .	154	Apr. 2, 1895,	9,050	1.71	-	-	-	-
Norfolk, ⁵ . . .	88	Sept. 21, 1894,	7,676	1.45	7,676	1.45	-	-
Norfolk, ⁶ . . .	356	July 8, 1897,	21,467	4.07	-	-	-	-
Norwood, . . .	51	July 21, 1894,	18,747	3.55	5,351	1.02	2,846	.54
Quincy, ⁷ . . .	237	Mar. 18, 1896,	9,920	1.88	-	-	-	-
Quincy, ⁸ . . .	292	Sept. 17, 1896,	7,400	1.40	-	-	-	-
Randolph, . . .	208	Aug. 3, 1895,	9,050	1.71	-	-	-	-
Sharon, . . .	159	Apr. 12, 1895,	28,713	5.44	-	-	-	-
Stoughton, . . .	228	Jan. 15, 1896,	20,538	3.89	-	-	-	-
Walpole, . . .	77	Aug. 4, 1894,	30,300	5.74	8,502	1.61	6,027	1.14
Westwood, . . .	354	July 2, 1897,	5,659	1.07	-	-	-	-
Weymouth, ⁹ . . .	59	July 27, 1894,	9,400	1.78	6,137	1.16	3,100	.59
Weymouth, ¹⁰ . . .	63	July 30, 1894,	1,330	.25	1,330	.25	-	-
Wrentham, . . .	32	July 10, 1894,	38,150	7.23	8,540	1.62	2,800	.53
Totals, . . .	.	.	332,272	62.94	43,353	8.22	16,973	3.21

Twenty-six petitions (two city and twenty-four town), in one city and twenty towns.

Average length petitioned for, 12,780 feet (2.42 miles).

Eighteen lay-outs, in seven towns; all lay-outs on town petitions.

Length laid out, 60,326 feet (11.43 miles); average, 2,320 feet (.44 mile).

Percentage of length laid out to length petitioned for, 18.19.

¹ No plan; distance scaled on map, Mansfield road.

³ Village Street.

⁵ North and South road.

⁸ Randolph Avenue.

⁶ East and West road.

⁹ Bridge Street.

² Village road.

⁴ Village, Main and Oakland streets.

⁷ Washington Street.

¹⁰ Ann Street.

Plymouth County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1849-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Abington, ¹ . . .	58	July 27, 1894,	8,700	1.66	-	-	-	-
Abington, ² . . .	192	June 19, 1895,	10,300	1.95	-	-	-	-
Bridgewater, . . .	217	Nov. 14, 1895,	6,600	1.25	-	-	-	-
Brockton, ³ . . .	61	July 27, 1894,	5,525	1.05	-	-	-	-
Brockton, ⁴ . . .	270	June 22, 1896,	5,037	.96	-	-	4,186	.79
Carver, . . .	326	Mar. 4, 1897,	5,280	1.00	-	-	-	-
Duxbury, . . .	70	July 31, 1894,	33,000	6.25	5,271	1.00	1,916	.36
East Bridgewater, . . .	240	Apr. 8, 1896,	6,300	1.19	-	-	-	-
Halifax, . . .	54	July 24, 1894,	23,463	4.44	-	-	-	-
Hanover, . . .	66	July 30, 1894,	24,157	4.58	-	-	-	-
Hanson, ⁵ . . .	262	June 12, 1896,	5,280	1.00	-	-	-	-
Hanson, ⁶ . . .	263	June 12, 1896,	5,280	1.00	-	-	-	-
Hingham, . . .	8	July 3, 1894,	27,655	5.24	11,385	2.15	2,652	.50
Lakeville, . . .	174	May 14, 1895,	5,300	1.00	-	-	-	-
Marion, . . .	29	July 10, 1894,	27,248	5.16	7,780	1.48	3,000	.59
Marshfield, . . .	71	July 31, 1894,	40,400	7.65	5,222	.99	-	-
Mattapoisett, . . .	30	July 10, 1894,	24,992	4.73	6,134	1.16	-	-
Middleborough, ⁷ . . .	68	July 31, 1894,	77,169	14.62	9,946	1.88	2,360	.44
Norwell, . . .	246	May 5, 1896,	5,923	1.12	-	-	-	-
Pembroke, . . .	234	Feb. 27, 1896,	5,280	1.00	-	-	-	-
Plymouth, ⁸ . . .	72	July 31, 1894,	90,420	17.13	7,509	1.42	-	-
Plymouth, ⁹ . . .	269	June 22, 1896,	5,846	1.11	5,846	1.11	-	-
Plymouth, . . .	374	Oct. 11, 1897,	9,130	1.73	-	-	5,417	1.02
Plympton, . . .	121	Jan. 22, 1895,	5,380	1.02	-	-	-	-
Rochester, . . .	172	May 13, 1895,	22,108	4.19	-	-	-	-
Rockland, . . .	75	Aug. 1, 1894,	6,900	1.30	-	-	-	-
Scituate, . . .	69	July 31, 1894,	28,500	5.39	6,139	1.17	-	-
Wareham, . . .	42	July 16, 1894,	60,100	11.38	3,014	.57	-	-
West Bridgewater, . . .	221	Dec. 4, 1895,	17,100	3.24	-	-	-	-
Whitman, . . .	65	July 30, 1894,	8,900	1.68	8,957	1.69	-	-
Totals, . . .	.	.	607,273	115.01	77,203	14.62	19,531	3.70

Thirty petitions (two city, twenty-eight town), in one city and twenty-four towns.

Average distance petitioned for, 20,242 feet (3.83 miles).

Thirty-three lay-outs, in one city and ten towns.

Length laid out on city petitions, 4,186 feet (.79 mile).

Length laid on town petitions, 92,548 feet (17.53 miles).

Total length laid out, 96,734 feet (18.32 miles); average, 2,931 feet (.56 mile).

Percentage of length laid out to distance petitioned for, 15.92.

¹ Randolph Street.

² Brockton Avenue.

³ Crescent Street.

⁴ Belmont Street.

⁵ Main Street.

⁶ Whitman Street.

⁷ Plan for 15,546 feet; balance scaled on map.

⁸ Plan for 8,211 feet; balance scaled on map, Shore road.

⁹ Pine Hills road.

Suffolk County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
					1894-96.		1897.	
			Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
Chelsea,	56	July 25, 1894,	6,000	1.14	-	-	-	-
Revere, ¹	60	July 27, 1894,	11,475	2.17	-	-	-	-
Revere, ²	346	June 10, 1897,	6,506	1.23	-	-	-	-
Revere, ³	350	June 24, 1897,	3,469	.66	-	-	3,045	.58
Winthrop,	73	July 31, 1894,	18,100	3.42	-	-	-	-
Totals, . . . .	.	.	45,550	8.62	-	-	3,045	.58

Five petitions (one city, four town), in one city and two towns.

Average distance petitioned for, 9,110 feet (1.73 miles).

Two lay outs, in one town.

Length laid out, 3,045 feet (.58 mile).

Percentage of length laid out to length petitioned for, 6.73.

¹ Salem turnpike.

² Ocean Avenue.

³ Atlantic Avenue.

Worcester County.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
					1894-96.		1897.	
			Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
Athol,	37	July 12, 1894,	16,800	3.18	8,475	1.61	-	-
Auburn,	148	Mar. 20, 1895,	12,100	2.29	6,904	1.31	3,268	.62
Barre,	146	Mar. 19, 1895,	15,286	2.89	-	-	3,545	.67
Blackstone, ¹	140	Mar. 2, 1895,	7,700	1.46	-	-	-	-
Blackstone, ²	399	Dec. 29, 1897,	12,296	2.33	-	-	-	-
Bolton,	185	June 3, 1895,	5,280	1.00	-	-	-	-
Boylston,	398	Dec. 23, 1897,	10,560	2.00	-	-	-	-
Brookfield, ³	111	Jan. 2, 1895,	5,972	1.13	-	-	-	-
Brookfield, ³	300	Nov. 27, 1896,	22,025	4.17	-	-	2,956	.56
Charlton, ⁴	261	June 11, 1896,	10,700	2.03	-	-	-	-
Charlton, ⁵	389	Dec. 13, 1897,	5,280	1.00	-	-	-	-
Dana,	294	Sept. 24, 1896,	10,560	2.00	-	-	-	-
Douglas,	384	Dec. 1, 1897,	10,567	2.00	-	-	-	-
Dudley,	391	Dec. 16, 1897,	15,840	3.00	-	-	-	-
Fitchburg, ⁶	17	July 5, 1894,	5,493	1.04	5,133	.97	-	-
Fitchburg, ⁷	62	July 30, 1894,	20,800	3.94	-	-	-	-

¹ Main Street, from Woonsocket line.

³ Springfield-Worcester road.

⁵ From Oxford line.

² Main Street, from Uxbridge line.

⁴ From Charlton depot.

⁷ Ashby road.

⁶ Westminster road.

Worcester County — Continued.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Fitchburg, ^{1,2} . . .	93	Oct. 3, 1894,	10,560	2.00	-	-	-	-
Fitchburg, ³ . . .	339	May 14, 1897,	5,280	1.00	-	-	3,196	.61
Gardner, . . .	13	July 3, 1894,	29,656	5.62	-	-	3,152	.60
Grafton, . . .	213	Aug. 15, 1895,	16,971	3.21	-	-	4,150	.79
Hardwick, . . .	207	July 31, 1895,	5,357	1.01	-	-	2,052	.39
Harvard, . . .	260	June 11, 1896,	25,775	4.88	-	-	-	-
Holden, . . .	10	July 3, 1894,	27,920	5.29	11,197	2.12	3,084	.58
Hopedale, . . .	144	Mar. 16, 1895,	6,040	1.14	-	-	-	-
Hubbardston, . . .	232	Feb. 24, 1896,	10,560	2.00	-	-	-	-
Lancaster, . . .	137	Feb. 28, 1895,	24,808	4.70	-	-	-	-
Leicester, . . .	25	July 9, 1894,	28,110	5.32	13,918	2.64	-	-
Leominster, ² . . .	91	Sept. 29, 1894,	26,400	5.00	-	-	-	-
Lunenburg, . . .	16	July 5, 1894,	30,772	5.83	-	-	-	-
Mendon, . . .	84	Aug. 20, 1894,	18,432	3.49	-	-	-	-
Millbury, . . .	372	Oct. 2, 1897,	19,400	3.68	-	-	-	-
New Braintree, . . .	210	Aug. 6, 1895,	939	.18	-	-	920	.17
Northborough, ⁴ . . .	122	Jan. 24, 1895,	3,834	.73	-	-	-	-
Northborough, ⁵ . . .	153	Apr. 1, 1895,	11,000	2.08	-	-	3,325	.63
Northborough, ⁴ . . .	373	Oct. 4, 1897,	2,200	.42	-	-	2,231	.42
North Brookfield, . . .	324	Feb. 25, 1897,	11,915	2.26	-	-	-	-
Oakham, . . .	199	July 11, 1895,	15,045	2.85	-	-	-	-
Oxford, . . .	108	Dec. 24, 1894,	33,550	6.35	-	-	-	-
Paxton, . . .	33	July 10, 1894,	28,500	5.40	12,436	2.36	1,496	.28
Petersham, . . .	296	Oct. 22, 1896,	23,744	4.49	-	-	-	-
Phillipston, . . .	14	July 3, 1894,	17,400	3.30	-	-	2,642	.50
Princeton, . . .	193	June 22, 1895,	14,221	2.69	-	-	2,602	.49
Royalston, . . .	302	Dec. 7, 1896,	23,195	4.39	-	-	-	-
Rutland, ⁶ . . .	141	Mar. 5, 1895,	24,581	4.65	-	-	-	-
Rutland, ⁷ . . .	142	Mar. 5, 1895,	24,268	4.59	-	-	-	-
Shrewsbury, ⁸ . . .	21	July 6, 1894,	11,000	2.08	9,217	1.74	1,783	.35
Shrewsbury, ⁸ . . .	308	Jan. 6, 1897,	4,092	.76	-	-	1,717	.33
Shrewsbury, ⁸ . . .	394	Dec. 22, 1897,	2,800	.53	-	-	-	-
Southborough, . . .	161	Apr. 18, 1895,	5,300	1.00	-	-	-	-
Spencer, ⁸ . . .	49	July 19, 1894,	23,418	4.44	-	-	2,276	.43
Spencer, ⁸ . . .	320	Feb. 19, 1897,	5,280	1.00	-	-	-	-

¹ Leominster road.² No plan; distance scaled on map.³ Lunenburg road.⁴ Westborough Hospital road.⁵ Marlborough-Worcester road.⁶ Holden road.⁷ Paxton road.⁸ Springfield-Worcester road.

Worcester County — Concluded.

COUNTY, CITY OR TOWN.	No.	Petition Received.	LENGTH PETITIONED FOR.		LENGTH LAID OUT.			
			Feet.	Miles.	1894-96.		1897.	
					Feet.	Miles.	Feet.	Miles.
Sterling, ¹ . . .	168	May 1, 1895,	5,280	1.00	-	-	4,034	.76
Sterling, ² . . .	318	Feb. 18, 1897,	5,280	1.00	-	-	-	-
Sterling, ³ . . .	319	Feb. 18, 1897,	12,829	2.45	-	-	-	-
Sterling, ¹ . . .	358	July 8, 1897,	500	.09	-	-	-	-
Sterling, ⁴ . . .	396	Dec. 23, 1897,	10,091	1.91	-	-	-	-
Sturbridge, . . .	169	May 7, 1895,	12,600	2.39	-	-	3,094	.59
Sutton, ⁵ . . .	85	Aug. 25, 1894,	6,096	1.16	-	-	-	-
Sutton, ⁴ . . .	385	Dec. 1, 1897,	4,778	.90	-	-	-	-
Templeton, . . .	86	Sept. 1, 1894,	31,668	6.00	-	-	-	-
Upton, . . .	305	Dec. 18, 1896,	24,743	4.69	-	-	-	-
Uxbridge, ⁶ . . .	89	Sept. 28, 1894,	15,759	2.99	-	-	-	-
Uxbridge, ⁷ . . .	379	Nov. 2, 1897,	6,140	1.17	-	-	3,563	.68
Warren, ⁸ . . .	15	July 5, 1894,	28,020	5.31	5,370	1.02	2,291	.43
Warren, ⁹ . . .	39	July 16, 1894,	18,868	3.57	-	-	-	-
Webster, . . .	392	Dec. 16, 1897,	7,700	1.46	-	-	-	-
Westborough, ¹⁰ . . .	160	Apr. 14, 1895,	1,100	.20	-	-	-	-
Westborough, ¹¹ . . .	306	Dec. 30, 1896,	5,300	1.00	-	-	-	-
Westborough, ¹⁰ . . .	371	Sept. 27, 1897,	2,579	.49	-	-	3,679	.70
West Boylston, ⁴ . . .	310	Jan. 15, 1897,	6,100	1.16	-	-	5,228	.99
West Boylston, ⁴ . . .	369	Sept. 22, 1897,	3,900	.74	-	-	-	-
West Brookfield, ¹² . . .	222	Dec. 5, 1895,	800	.15	-	-	-	-
West Brookfield, ⁸ . . .	312	Jan. 25, 1897,	13,350	2.53	-	-	-	-
West Brookfield, ⁸ . . .	352	Nov. 12, 1897,	5,280	1.00	-	-	-	-
Westminster, . . .	23	July 9, 1894,	30,590	5.79	8,950	1.70	2,723	.52
Winchendon, . . .	317	Feb. 17, 1897,	8,861	1.68	-	-	-	-
Worcester, ¹³ . . .	162	Apr. 22, 1895,	7,636	1.44	5,300	1.00	1,857	.35
Worcester, ¹⁴ . . .	327	Mar. 4, 1897,	12,150	2.30	-	-	3,486	.66
Worcester, ¹⁵ . . .	328	Mar. 4, 1897,	20,445	3.87	-	-	-	-
Totals, . . .	.	.	1,068,025	202.28	86,900	16.45	74,350	14.09

Seventy-nine petitions (seven city, seventy two town) in two cities and fifty-two towns.

Average distance petitioned for, 13,517 feet (2.56 miles).

Fifty-four lay-outs, in two cities and twenty-three towns.

Laid out on city petitions, 18,972 feet (3.60 miles).

Laid out on town petitions, 142,278 feet (26.94 miles).

Total length laid out, 161,250 feet (30.54 miles); average, 2,986 feet (.57 mile).

Percentage of length laid out to length petitioned for, 15.05.

¹ Main Street. ² Leominster road.

⁵ Wilkinsonville-Grafton road.

⁸ Springfield-Worcester road.

¹⁰ Westborough Hospital road.

¹² Ware road.

¹³ Paxton road.

³ Lancaster road.

⁶ Blackstone road.

⁹ Road to Brimfield and Wales.

¹¹ Agricultural Grounds road.

¹⁴ Holden road.

⁴ Worcester road.

⁷ Mendon road.

¹⁵ West Boylston road.

Statement showing Number of County, City and Town Petitions, Distribution of Petitions among Municipalities, and Number of Cities and Towns in which Lay-outs have been made, by Counties.

COUNTIES.	PETITIONS RECEIVED FROM —				PETITIONS SITUATED IN —			LAY-OUTS MADE IN —			Number of Lay- outs.
	Counties.	Cities.	Towns.	Total.	Cities.	Towns.	Total.	Cities.	Towns.	Total.	
Barnstable, . . .	-	-	18	18	-	13	13	-	7	7	23
Berkshire, . . .	12	5	24	41	2	20	22	2	8	10	23
Bristol,	1	4	20	25	2	16	18	1	6	7	18
Dukes,	2	-	4	6	-	5	5	-	4	4	8
Essex,	1	11	25	37	6	24	30	4	6	10	17
Franklin,	1	-	27	28	-	15	15	-	7	7	17
Hampden,	4	1	13	18	2	15	17	1	6	7	20
Hampshire,	1	2	23	26	1	17	18	1	8	9	17
Middlesex,	5	5	50	60	4	41	45	2	13	15	27
Nantucket,	-	-	1	1	-	1	1	-	1	1	6
Norfolk,	-	2	24	26	1	20	21	-	7	7	18
Plymouth,	-	2	28	30	1	24	25	1	10	11	33
Suffolk,	-	1	4	5	1	2	3	-	1	1	2
Worcester,	-	7	72	79	2	52	54	2	23	25	54
Totals,	27	40	333	400	22	265	287	14	107	121	283

Summary of Lengths petitioned for and laid out, by Counties, together with Percentage of Lengths laid out to Lengths petitioned for.

COUNTIES.	LENGTHS PETITIONED FOR.		LENGTHS LAID OUT.						Per- cent- age.
			1894-96.		1897.		Total.		
	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.	
Barnstable, . . .	320,288	60.66	62,874	11.91	34,296	6.49	97,170	18.40	30.33
Berkshire, . . .	358,438	67.89	59,518	11.27	14,562	2.76	74,080	14.03	20.67
Bristol, . . .	482,385	91.36	60,176	11.40	12,008	2.27	72,184	13.67	18.88
Dukes, . . .	119,635	22.66	35,932	6.80	3,505	.67	39,437	7.47	32.96
Essex, . . .	562,993	106.63	43,238	8.20	16,791	3.18	60,079	11.38	10.67
Franklin, . . .	278,881	52.82	35,324	6.68	14,079	2.66	49,403	9.34	18.94
Hampden, . . .	390,715	74.00	49,327	9.34	14,965	2.84	64,292	12.18	16.45
Hampshire, . . .	257,582	48.78	42,267	8.00	7,286	1.38	49,553	9.38	19.16
Middlesex, . . .	920,041	174.25	49,576	9.39	47,090	8.92	96,666	18.31	10.51
Nantucket, . . .	34,185	6.50	19,630	3.73	2,640	.50	22,270	4.23	65.08
Norfolk, . . .	332,272	62.94	43,353	8.22	16,973	3.21	60,326	11.43	18.19
Plymouth, . . .	607,273	115.01	77,203	14.62	19,531	3.70	96,734	18.32	15.92
Suffolk, . . .	45,550	8.62	-	-	3,045	.58	3,045	.58	6.73
Worcester, . . .	1,068,025	202.28	86,900	16.45	74,350	14.09	161,250	30.54	15.05
Totals, . . .	5,778,263	1,094.40	665,368	126.01	281,121	53.25	946,489	179.26	16.38

Laid out on county petitions, 228,453 feet (43.27 miles).

Laid out on city petitions, 65,348 feet (12.38 miles).

Laid out on town petitions, 652,688 feet (123.61 miles).

Average distance petitioned for, 14,446 feet (2.74 miles).

Average length laid out, 3,408 feet (.65 mile).

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